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PHC80-R-2D

History

Part D

Chapter 6.
Data Processing

Chapter 8.
Data Products

1980

Census of Population and Housing

U.S. Department of Commerce
BUREAU OF THE CENSUS

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Issued June 1989

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Preface

The following chapters are portions of the *1980 Census of Population and Housing: History* (PHC80-R-2). This report describes in detail most aspects of the 1980 census, from its early stages of research and planning through the tabulation, publication, and dissemination of the final results. The detailed treatment includes, where appropriate, a discussion of some of the problems encountered in implementing the census plan.

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Chapter 6. Data Processing

INTRODUCTION

As each district office closed, it boxed and shipped its questionnaires, address registers, and miscellaneous materials by truck to one of three clerical processing offices—in Jeffersonville, IN, New Orleans, LA, or Laguna Niguel, CA—where the data from about 90 million report forms would be coded where necessary, microfilmed, scanned, and the data transmitted to the Bureau's headquarters in Suitland, MD, for final processing and tabulation. The preliminary processing task required space for storage and warehousing, large clerical staffs, and a mass of electronic and mechanical equipment that could not be accommodated at a single location.

ORGANIZATIONAL STRUCTURE

The Bureau created a Decennial Processing Staff (DPS), under the Associate Director for Field Operations and his Assistant Director for Processing, to organize and control the clerical and precomputer processing of census questionnaires. The DPS was abolished in March 1982, after its task was completed. The Decennial Census Division (DCD), under the Associate Director for Demographic Fields and his Assistant Director for Demographic Censuses, helped plan and conduct the census effort. The Field Division (FLD) worked closely with DPS and DCD on the processing center operations. During diary review and computer processing, the two subject matter divisions, Population (POP) and Housing (HOUS), and several computer-oriented and administrative divisions were heavily involved in processing activities. The Organization and Management Systems Division set production standards, while the Statistical Methods Division established the standards for quality control.

Each processing office had a manager and two assistant managers—one for administration, the other for operations. The assistant manager for administration was responsible for providing general support and "housekeeping" services, and supervised administrative support (i.e. facilities and space management, local payroll operations, hiring, security, etc.), training, automated-data processing support, production standards and incentive awards (Laguna Niguel and New Orleans offices only), and information control units. The assistant manager for operations directed the processing operations themselves, supervising the coding and general processing operations units. These positions, and other top supervisory slots, were filled by career Census Bureau personnel.

In a shift from the 1970 census organizational pattern, when basically the same processing organization controlled both production and quality control (QC), each processing office in the 1980 census had a separate QC and evaluation staff reporting to the office manager. This staff implemented and managed QC and evaluation programs for all processing activities within the office; and hired, scheduled or trained, and managed all personnel engaged in carrying out the QC and evaluation (as distinguished from production) requirements. The staff included a unit that handled all documents affecting its operations.

ESTABLISHING THE PROCESSING OFFICES

General Information

While the three processing offices opened well before the census and took part in a variety of precensus activities (see chs. 3 and 5 for details), their principal job was to process the census questionnaires and other materials and transfer the data contained therein to computer tape for processing and tabulation. They performed the following major operations:

1. Receiving and unloading trucks arriving from district offices, and sorting, palletizing, and holding the materials received until they could be routed to check-in.
2. Checking in questionnaires, address registers, and miscellaneous materials to establish an initial inventory of district office receipts. (For boxes of questionnaires and address registers, the check-in included affixing a bar-code label to assist in tracking these materials through the processing system.)
3. Shelving materials received in the appropriate libraries to provide a permanent location for all materials to be kept while they were not in the processing flow.
4. Controlling the questionnaires through the basic processing operations required to convert the data contained to a computer-usable form. These operations were: 100-percent microfilming, 100-percent diary review, 100-percent remicrofilming, sample coding, sample microfilming, sample diary review, and sample remicrofilming.
5. Resolving geographic problems identified in check-in and diary review.
6. Conducting evaluations and special studies of census content and methodology (see ch. 9).
7. Implementing a quality-control (QC) program for all activities performed in the processing offices.

Planning for and Obtaining the Sites

Early in the 1980 census planning period, a committee was formed to develop clerical processing office procedures to use in transferring the data from the questionnaires onto computer tapes for tabulation and cross classification. This expensive, lengthy, and labor-intensive task had taxed the one site used for the 1970 census, so the Bureau decided to distribute the 1980 clerical processing among four strategic locations-later changed to three—Jeffersonville, IN, New Orleans, LA, and Laguna Niguel, CA.

At Jeffersonville, the Census Bureau established the processing office within the Data Preparation Division (DPD) office already in place, as had been done for 1970. The Laguna Niguel and New Orleans sites were selected in part because (1) there were already large Federal Government office facilities in operation; the General Services Administration (GSA) managed such a complex in Laguna Niguel and the National Aeronautics and Space Administration (NASA) had offices in New Orleans, from which floor space (approximately 320,000 square feet was needed for each processing office) and equipment could be leased; (2) the respective areas had transportation and communications services to adequately service each office; and (3) the labor pool available could provide the necessary work force.

Opening the Processing Offices

The New Orleans and Laguna Niguel offices opened in February, and the Jeffersonville processing operation in August, 1978, to accommodate certain precensus operations, such as kit assembly and tape-address register/advance post-office check (TAR/APOC) and prelist address register keying (see chs. 5 and 3 respectively for details). The early opening also made it possible to prepare for a timely handling of the district office output of questionnaires and address registers.

Logistics

Supplies—The Decennial Processing Staff (DPS) at Bureau headquarters procured such key items as the following:

Item	Number
Cardboard desks	6,670
Rolling bins	6,216
Plastic inserts	800,000
Steel shelving	182,275[1]

[1]These were steel shelves for boxes of questionnaires and address registers (AR's), and maps. The shelves for questionnaire boxes were 30" deep by 42" wide and were assembled into units with 10" between shelves, allowing for three boxes to be stored side by side, and stacked four deep. The AR boxes were 16" deep by 11 1/2" wide, and 1/2" high. The AR shelving was assembled with 13" between shelves, and the AR's were stacked on the shelves on their sides. The shelves could be assembled into units of varying overall height to make maximum use of available space.

At the same time, DPS and Field Division arranged, through the 12 regional census centers (RCC's), for shipment of unneeded furniture and other supplies from some of the 409 district offices to the processing offices. The desks were for employees' work stations, while the rolling bins were used to move materials (boxes of questionnaires, address registers, etc.). The plastic inserts were for all enumeration district (ED) questionnaire boxes and the steel shelving was used for storage of processing materials, including questionnaires and other documents.

The procurement, rental, and distribution procedures used for the 1980 census equipment and supplies were similar to those employed for 1970. DPS procured and/or rented most equipment and supplies for the processing offices through the Administrative Services Division (ASD), which forwarded requests for equipment and supplies to GSA or private vendors as appropriate. Some specialized equipment for processing offices required early procurement, with delivery dates scheduled at the completion of site preparation. The Department of Commerce (DOC) purchasing staff had to approve procurement of specialized items; i.e., automated data-processing equipment, film processing equipment, steel shelving, and so on.

For 1980, DPS identified the equipment and supplies needed for the processing offices—including all printed materials used exclusively in the processing sites, such as evaluation forms and procedures, and Population Division (POP) provided all coding manuals and training materials. With five different units ordering and reordering supplies, there was considerable difficulty in controlling delivery and receipt dates for certain supplies, and the Bureau experienced some processing delays as a result.

Supplies, printed matter, equipment, and furniture requirements were based on estimates of operational needs, and until operational procedures had been established, these had to be calculated from previous censuses as updated by test censuses. A great deal of planning went into the development of comprehensive lists of equipment, furniture, and supplies required in taking and processing the census. Lists of materials were circulated to various segments of the Bureau for comments, and conferences were held to decide on final requirements. Comprehensive planning eliminated most requirements for emergency purchases, but some problems did arise and had to be dealt with immediately.

For example:

- Steel shelving units had been received in the New Orleans processing office without sufficient quantities of cross braces, nuts, and bolts.
- The roof collapsed on building 220 of the New Orleans processing office, damaging or destroying many expendable supplies and steel shelving.
- Occasionally, items that had been ordered did not arrive in time for an operation.

When emergency purchasing requirements arose in the processing offices, they were handled in one of the following ways:

1. Purchase order. When time allowed, a form CD-45 (Supply, Equipment, or Service Order) was prepared and forwarded to the headquarters procurement office, ASD. To expedite delivery in emergency situations, ASD telephoned purchase order numbers to a vendor.

2. Emergency procurement authority. Authority was delegated to the chiefs of the New Orleans and Laguna Niguel processing offices for the emergency purchase of noncapital items and services, not to exceed $500 per order. Invoices for payment were approved by the processing office chiefs and forwarded to Finance Division (FIN).

3. Shipment from other offices. When emergency requirements arose (particularly in the case of specialized items such as white correction dots and colored tape), supplies were sent from headquarters, DO's, or processing offices to cover the immediate need until formal orders could be processed.

4. Imprest fund. The New Orleans and Laguna Niguel processing offices were allowed to establish $1,000 imprest funds.

5. Blanket purchase orders. The processing offices issued these for supplies such as lumber, plywood, cardboard cartons, envelopes, hardware, and office supplies, and drew on them when emergency requirements arose.

6. Printing. The processing offices were authorized to deal directly with their respective (GPO) Government Printing Office facilities for emergency printing requirements.

Staffing—The Census Bureau took 18 months and employed approximately 6,300 temporary staff members at peak levels to complete the postenumeration processing at the three offices. The Decennial Processing Staff (DPS) at Bureau headquarters was created to organize and control the clerical and precomputer work at the processing sites, while the computer processing was done at the Suitland, MD headquarters. Top supervisors were selected primarily from among the Bureau's career staff; clerical employees were chosen through the civil service system or through special waivers when necessary. Professional and technical subject-matter review of the FOSDIC generated computer totals and the computer processing activity itself was done by headquarters staff.

The processing office staffs were recruited from the local labor force, and were to have a race-ethnic mix comparable to that of the surrounding population; hence affirmative action hiring plans were developed for each site. Senior supervisory and technical positions—i.e., office managers and assistant managers, branch chiefs, certain staff administrative positions, and selected technical positions—were filled by permanent Census Bureau employees assigned from headquarters or the regional offices. (For the Jeffersonville office, DPD staff filled most of the senior slots.) The remaining supervisory positions, as well as the mass of the clerical, service, and other jobs, were filled from the local workforce.

The Census Bureau recruited personnel directly, as well as accepting referrals from various local civic, civil rights, and other appropriate sources. Each applicant had to meet the following requirements for possible hiring:

1. Be able to do most office tasks and, for some positions, be capable of specified physical labor, such as loading or unloading pallets, lifting specified weights, moving rolling bins, and so on.

2. Be at least 18 years of age, although 16- or 17-year olds could be hired if they met employment conditions set by local and State governments and were high school graduates or had equivalent education or work experience.

3. Be available to work a 40-hour work week and, for some jobs, to work specified shift schedules.

4. Anyone barred from a civil service examination could not be considered for employment.

5. Federal civil service annuitants were discouraged from applying.

6. A satisfactory work record prior to hiring. Poor job performance, immoral conduct, or conviction of a law violation since age 18 for something other than a minor traffic violation could be the basis for disqualification.

The principal means of selection for hiring was a written test administered to applicants, although this requirement was waived in some instances. Final selections for hiring were made by the personnel office at each processing site.

Recruiting, testing, and hiring began before the offices opened in 1978, and continued through much of their 4-year existence. With the general turnover of the workforce, over 11,000 people were hired.

Training—The training for over 200 different processing operations had to be conducted on parallel tracks at each of the three sites. Census requirements demanded that each employee be trained using a program that taught the same procedures in the same way in every session at each location in an extremely short time span. Since highly complex and sophisticated procedures had to be used to track literally millions of items, training techniques that simplified the instructions were essential. Because of the personnel attrition inherent in a large temporary operation, training had to be repeated over the life of the project. The training plan had to (1) minimize hiring a

permanent staff of "subject experts" to present each session, and (2) provide the right combination of instruction and practice, with the use of visual displays to shorten the initial instructional phase.

While planning the processing operation, the Census Bureau staff identified those processing operations (including administrative and support functions) requiring some form of classroom or on-the-job (OJT) training. Training for about 20 of these—the more technical- and/or action-intensive—required using video aids. For the remainder, the Bureau used other training media, such as OJT, special outside "vendor sponsored" programs, (as in film processing), and occasional classroom lecture techniques, using job aids—either procedures manuals or other reference material. The agency prepared training packages for each program that included a training guide, media presentation (if a video program), practice exercises or workbooks, and a job aid.

After analyzing the available training methodologies, the cost and time constraints, and the processing requirements, the staff selected videotaped modules prepared by headquarters staff as the primary training tools, rather than the verbatim guides followed in the field district offices. (Guides were used, however, in conjunction with audiovisual presentations.) An Office of Management and Budget (OMB) directive required that audiovisual materials be controlled, reviewed, and approved by the Commerce Audiovisual Review Committee before they were used officially. The Committee carried out its review in the first half of 1979, releasing the materials for use in June. An outside consulting firm assisted in planning the selection and subsequent production of the programs, and a joint agreement between the Bureau and the Office of Personnel Management (OPM) enabled the Bureau to use OPM's studios to produce these video programs at significant savings in time and money. The Bureau also developed a "Training Package Development Operating Plan" and a basic training guide as a precaution against late completion of the video materials.

The production schedules were tight for the video modules because of the limited availability of Government production studios. OPM required script writers, production managers, and "script doctors" to be used, but this proved time-consuming, causing significant scheduling problems. After experiencing considerable difficulty in preparing the video materials, the Census Bureau decided to use subject-matter and operational experts from the respective areas to design outlines for each training program. These outlines included visual aids (e.g., word cards, art work, and slides), and were used by the subject-matter experts to deliver the operational instructions directly onto videotape. DPS also contacted several other Government studios—at the Department of Health, Education, and Welfare (HEW), the National Institutes of Health (NIH), and the Department of Defense (DOD)—and obtained permission to use their facilities. DPS and OPM thus were producing video packages simultaneously.

The Census Bureau developed two "test" training programs for the dress rehearsal, using 21-inch color monitors and video recorders employing 3/4-inch tape. These proved successful, and for the census, the following equipment was procured and used:

1. 25-inch monitors—10 at each processing center.
2. 1/2-inch video players—six at each processing center.
3. 1/2-inch video recorders (to correct tapes and make additional tapes)—two at each processing center.
4. 1/2-inch portable audio tape recorders (to record the operations in session)—one at each processing center.
5. Portable cameras (to make tapes in-house and for use with the portable recorders)—two each at Jeffersonville and New Orleans and one at Laguna Niguel.

Much of the training had to cover a variety of technical skills (for example, microfilming, library operations, and coding) for several different jobs, such as supervisor, control clerk, quality control clerk, and processing clerk. The instructions had certain elements in common, such as materials security, questionnaire condition, safety, and the overall processing system, and package designs employed a modular approach to minimize repetition in the training materials. Because each module was "customized" to address specific tasks within each of the operations, it was possible to construct specialized training sessions by assembling the right modules. This substantially reduced the time required for training by concentrating only on those areas the trainees were required to know about to do their jobs effectively. It also satisfied the consistency requirement, since each specialized session was universal throughout each office.

A single classification and control system was designed, with a series of module checklists for every operation that identified the modules trainees for a specific job would receive. (The instructional information common to all operations was combined within a single module and shown only once to each trainee.) Each module was given a classification number identifying it by processing operation (e.g., receipt), position (e.g., processing clerk), and type of material (e.g., audiovisual (A/V) tape).

The unique training requirements for the 1980 processing operation-training over 11,000 people during more than 500 separate sessions—called for close coordination of the training schedule. A training branch was created in each processing office, headed by a "master trainer" (education specialist), with a scheduling unit and a library unit, each headed by a training assistant. The scheduling unit received from the operational managers the training requests specifying the operational job type requiring training, verified available training space for the date requested, and determined what special arrangements, if any, had to be made. The library unit assembled the necessary modules and materials and notified the instructors to prepare

for the session. When each session was concluded, the library unit picked up any equipment and unused materials so that they would be available for other sessions. Training began in early June 1980. A total of 1,811 supervisors and over 9,000 clerks were selected and trained at the three processing office sites.

The training branches at the individual processing offices informed the operational staff of revisions to all materials maintained by the training library units. Minor problems encountered included discrepancies in the training system classification of materials (library number) and the volume-chapter-section identification system for the operational procedures manual. Most problems encountered were correctable and the existing instructions modifiable to alleviate special situations without serious consequences. Training for management and supervisors was formally scheduled, while the clerical training was scheduled on a "need" basis, depending on the starting dates of the operations and the requirements for replacement training and retraining.

All three processing offices had problems with regard to adequate space for training employees. At the Jeffersonville processing office, no permanent library space was available at first, so training materials were placed on rolling bins while the written plan for organizing the library was being followed. Once training began, some materials for several 100-percent operations arrived late, so the system had to be modified. After the initial management and supervisory training sessions were concluded and 100-percent operational training began, however, the system functioned as designed. At the New Orleans and Laguna Niguel offices, some of the assigned space was not suited for classroom training, reducing training effectiveness. The New Orleans office had further difficulties because shelving for the storage of training materials did not arrive on time and there were, at first, insufficient materials to support the number of trainees.

Overall, the biggest problems were lack of adequate space for both training and storage of training materials, lack of adequate training materials for some operations due to staff increases, late arrival of some materials for scheduled sessions, and the duplication and distribution of procedural revisions.

Payrolling—The processing office staffs were composed of "regular" Census Bureau permanent and temporary employees, and were paid on the standard civil service GS/GG scales for their respective grades. The respective processing offices' personnel units were responsible for timekeeping for all employees at their sites, but the actual payroll operation was handled through the payroll office at the Suitland headquarters. As the processing offices were activated and their staffs recruited, payroll clerks were added to the Suitland payroll office staff—one for each 500 employees at the processing offices. When the processing office staffs reached their maximum strength, they employed approximately 6,300 people, and 13 extra payroll clerks on the headquarters staff handled pay records for that workforce.

The staffs were paid on the regular biweekly schedule, with checks issued at headquarters, and had the same options for automatic deposit or delivery of the checks as did other Census Bureau personnel. Checks to be issued directly were delivered to the processing sites by courier.

Security—The processing center operations required the temporary storage of massive amounts of confidential materials. Security was a major concern because of the risks of (1) destruction of address registers or of the original questionnaires before microfilming (the address registers were not microfilmed) and transmission of the data to headquarters, (2) violation of the confidentiality of the census records, and (3) damage to a variety of automated data processing, microfilming, and FOSDIC equipment, all vulnerable to fire or water damage. Each processing office designated a number of area security officers to assist in the overall security program.

Access to the processing offices was tightly controlled. There were uniformed guards at pedestrian entrances and exits, and standard Government fire control systems and damage control procedures were established. Each employee was issued a badge authorizing access to census offices, with additional badges worn by personnel requiring access to the questionnaire library and to the camera and automated data-processing areas. Visitors had to have special visitors' identification badges. All employees were reminded quarterly of their security and confidentiality responsibilities.

The security policy for the camera and automatic data-processing (ADP) areas required that such things as cameras, FOSDIC equipment, video training equipment, remote job entry (RJE) terminals, ENTREX data-entry equipment, and film processing equipment receive special protection from unauthorized use and malicious damage. Several steps were taken to implement this program:

- Each processing office appointed a permanent-staff member as ADP security coordinator.
- All entrances of the FOSDIC, RJE, ENTREX, and film processing areas were secured with cipher locks. Only persons whose jobs required access to this equipment had the cipher combination. The RJE rooms also were fitted with deadbolt locks, and rooms had to be locked when left unattended.
- An employee within the camera area was designated an area security officer to ensure that access to the camera room was limited to authorized personnel only.
- Visitors to the camera and ADP areas had to have the ADP security coordinator's permission and be escorted at all times.

- An ADP escort had to be present if these areas were to be cleaned after working hours.
- All camera and ADP areas had to be locked when unattended.

The processing offices used a number of terminals to enter the required data for the automated inventory and control system (AICS) and to query these data. These terminals were located at key control points throughout the processing offices, but not always in areas that could be secured to meet minimum terminal and data security requirements. To prevent unauthorized use, each terminal had a lock interconnected with the unit's power supply switch. This required the use of a key before an operator could use an individual unit and permitted security control by unit regardless of location. The total communications network was disabled each evening by disconnecting the terminal communication lines at the network's communication concentrators. This automatically prevented access to the timesharing service. Finally, the acoustical couplers were stored in the locked terminal console cabinets each evening. The coupler provided an alterative means for terminal communications.

Management Information System

This automated system was designed for the 1980 census to provide pertinent information on the processing operations in a timely and efficient manner for use both in the offices and at headquarters. Every day, clerks keyed data received from the quality-assurance operations and grouped them into batches that were transmitted once a week to a main data base in Columbus, OH. From this base, each processing office printed out various types of output reports for its own use in management, and the Decennial Processing Staff's Inventory Control Branch distributed them weekly at Bureau headquarters.

The reports allowed management to make decisions about the coding and other processes and make comparisons among the three offices; for example, the summaries of coding production, error, number of enumeration districts processed, etc., showed both weekly and cumulative progress, while data on the distribution of production and error rates were useful in statistical testing.

The MIS included some programmed edits that checked for the validity of the data and for incompatible decision relationships (e.g., a decision to accept a unit of work but yet to retrain the coder). The MIS also did some simple linear regression analysis. In general, the system worked well after various problems were identified and corrected during testing. One major problem was solved by modifying the program to accept one set of data from one processing office at a time; prior to that, the computer in Columbus would only receive data if all three offices were transmitting the data at the same time. Other difficulties were detected later, such as delays in sending records to the MIS keyers, errors in keying (such as identifying the wrong coder) despite 100-percent verification, and trouble weighting estimated error rates by computer when quality-control sampling rates were changed.

In an effort to eliminate indiscriminate changes, the Bureau instituted a document, form D-1440, Problem Identification and Resolution Record, which everyone perceiving a need for a change in procedures was required to use, even though solutions might be suggested and negotiated face-to-face or by telephone more or less simultaneously. The form D-1440, normally including a recommended solution, was sent to the Decennial Processing Staff (DPS), which circulated it to the appropriate divisions for review and return. DPS then disseminated the agreed-upon action. Several thousand changes were made in this way, normally with a 2-day turnaround.

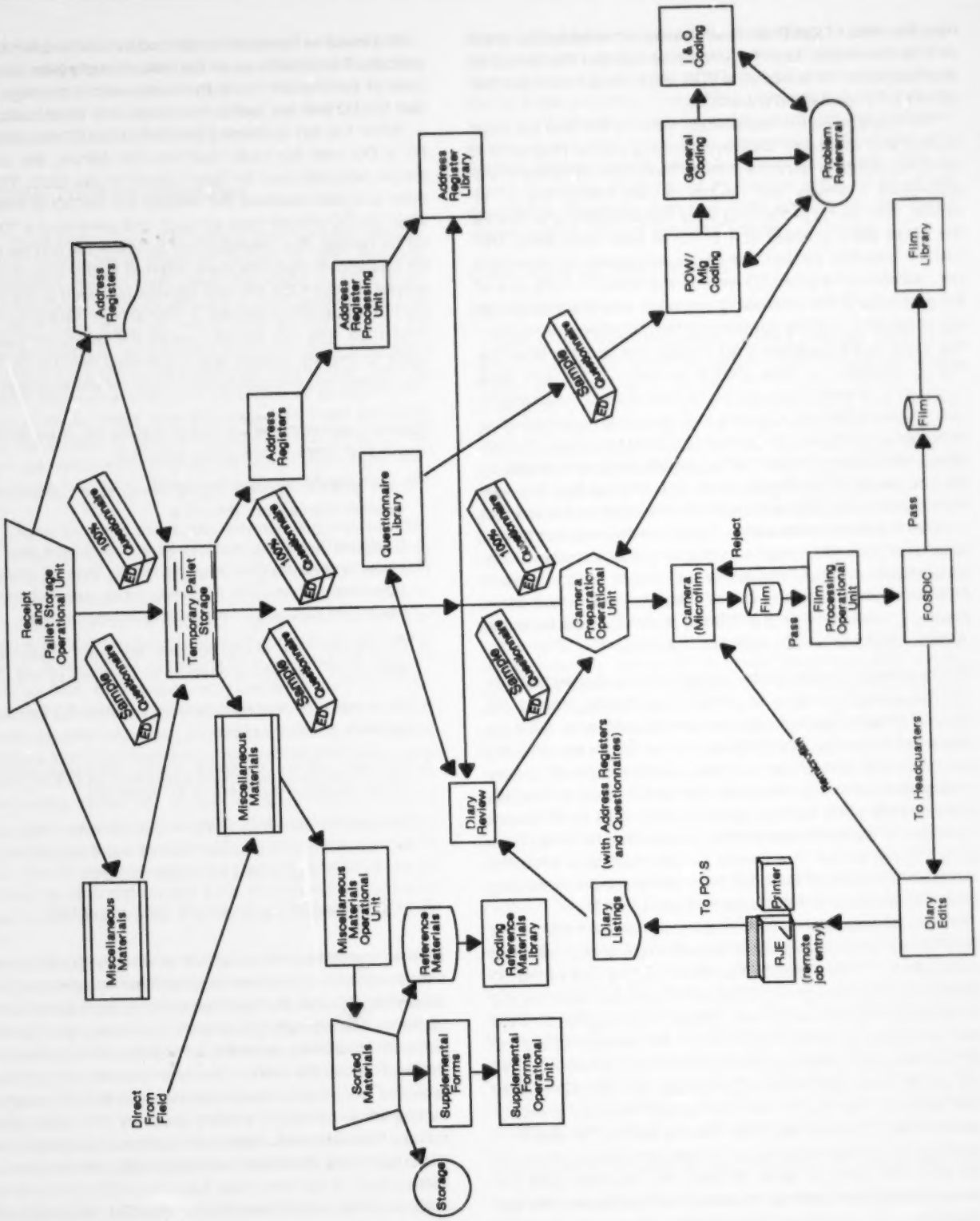
RECEIPT AND CHECK-IN

General Procedures

The processing operation began with the 409 district offices shipping their ED boxes to one of the three processing offices. This was done on a flow basis from the first week of August 1980 until late December 1980, with a very large proportion of material arriving late in September (e.g., at the New Orleans office, almost 80 percent of receipts were received in the last 2 weeks of September). While some of the district offices (DO's) closed in August 1980, the majority of them remained open until mid September, and the last office closed in December 1980 (see ch. 5). The range of receipt dates for the 1980 decennial census was approximately 3 months later than the comparable dates for the 1970 decennial census, which delayed the start of the processing and forced the Census Bureau to compress the original 6-month processing schedule into only 3 1/2 months.

As materials arrived at the processing offices, they were sorted and loaded for bulk handling onto cargo pallets, which were placed in racks for temporary storage. These operations were subjected to formal quality assurance (QA) procedures. On request from the Information Control Branch (ICB), the Receipt and Pallet Storage Unit delivered pallets containing ED boxes, on a flow basis, by DO to the Check-In Unit. There the pallets were unloaded and the boxes of questionnaires stacked by ED on conveyor belts. (The conveyor belts were arranged like a horseshoe within the ED Check-In Unit.) The boxes were removed from the conveyor, by DO/ED, the bindings were cut, and the lids removed. The label of the top questionnaire, visible through a window in the packing material, was verified against the information listed on the external label for each ED box—i.e.,the clerks determined that boxes marked as containing long forms did in fact contain long forms, and that the DO and ED numbers written on the box label were the same as the DO/ED on the questionnaire label. All damaged boxes, and

1980 Primary Processing Flow



boxes in which DO/ED verification was not established, were sent to the Repair Unit for corrective action. The boxes of questionnaires for acceptable ED's were placed on a second conveyor for continued processing.

The appropriate bar code labels for each DO and ED were located and applied to the corresponding boxes. (The unique bar-code numbers were the primary identification device in the automated inventory and control system (AICS, see p. 13 below), and during processing were electronically scanned as the boxes were checked in and out of each work area. This made it possible, through the computer system, to tell where the materials for a given ED were at any time.) In 1970, one of the problems in the processing operation was the interchanging of box lids. The lids contained information on the processing status of the questionnaires in each box and identified the DO/ED involved. In large clerical operations, the lids were removed to process the questionnaires and often the wrong lid was placed on the box, resulting in questionnaires being lost or improperly processed. To prevent this from recurring, all identifying information for the 1980 questionnaires was placed on the end panel of the box bottom. The original box top was replaced with one that had a clear plastic insert in the end that covered the box-bottom panel. The bar-code label was placed so it could be read through a cutout or notched section of the plastic by a hand-held optical "wand" linked to the Bureau's AICS computer. If all the boxes were stacked in the same direction, verification of the DO/ED number could be made without having to handle each box manually.

Quality control—Quality-control checks were conducted throughout the entire operation to identify improperly labeled ED boxes, damaged plastic fronts, and similar problems. After the bar-code labels had been affixed to the ED boxes and the proper quality control review was completed, the ED boxes were placed on rolling bins, identified by ED range within DO, and bar-code read (by bin) into the AICS. ED's or ED boxes identified by the system as problem cases were removed from each bin and placed in a special bin for resolution. After the materials for problem ED's had been removed, the remaining boxes were sent to the ED Questionnaire Library.

The quality assurance (QA) clerks verified a sample of the ED's boxes. If problems were encountered, these materials were referred to the Problem Resolution Unit by way of the ED Check-In Unit control clerk. Acceptable ED boxes were passed to the end of the conveyor belt, loaded into designated range bins, and sent to the bar-code station for check-in to the ED library. The bins containing the original ED box lids were sent to the plastic-insert unit, where clerks used special box cutters that removed the end of the box lid and replaced it with a plastic insert. Filament tape was used to secure the plastic in place and to reinforce the sides of defective boxes. (Many of the box tabs were too short to snap into the slots after the plastic fronts were inserted, however, and the tape made the plastic insert very secure.) The finished lids were placed in rolling bins to be routed to the check-in line for reuse.

The check-in line occasionally had to be shut down for short periods of time because of the lack of empty bins, and at the peak of the check-in cycle there was such a shortage of bins that the ED box lids had to be loaded onto hand trucks.

When the bin containing the last of the ED questionnaires for a DO was bar-code read into the library, the bar-code station operator sent an "end" signal to the AICS. The computer program matched the receipts for the DO to a listing of what the DO should have shipped, and generated a "DO edit" list for review. Any discrepancies between the edit list and the list of shipped materials were referred to the Search Unit for resolution. Once the DO edit list was reviewed and accepted, the ICB was notified and ran a "DO accept" listing for the DO concerned. The DO accept caused the computer system to begin generating Staging and Transmittal Records (STR's) for the 100-percent processing workflows for the accepted DO.

Problems encountered—Some problems occurred during the receipt and check-in operation, including:

1. Late shipments, and highly compressed shipments, of questionnaires from the DO's.
2. Inadequate staffing and space in the receipt and pallet-storage area, and for moving rolling bins of material to operational units. (This problem was caused, in part, by the backup of material from the DO's late shipments.
3. Occasional lack of appropriate bar-code labels for DO shipments released to check-in or released by the ICB.
4. Slowdowns caused by referral of problem-ED forms to the Problem Resolution Unit.
5. Delayed training of some quality-assurance personnel, which slowed movement of ED materials.
6. Difficulty in determining ED sequence when dealing with DO materials split between two or more shipments, once the DO edit listing was no longer available.
7. Inadequate staffing for the Plastic Inserter Unit.

Problem resolution—In a section devoted to problem resolution, the incoming bins from the check-in line were prominently labeled by DO, and the specific problems were identified, e.g., labels to be ordered, geographic problems, etc. When the bar-code labels were received, the repair clerks applied them to the appropriate ED boxes. The large number of labels being received sometimes caused the clerks to spend many hours cutting them apart and sorting them by DO. After about a month, the clerks were allowed to prepare handmade labels, which improved the flow of work out of the problem resolution section.

Every effort was made to preserve DO integrity, and the repair clerks tried to work on a specific DO and resolve the problem identified before moving on to the next one. During

the peak of the check-in operation, this proved to be impossible, and the clerks had to work on many different DO's at the same time in order to complete bins of ED's. They routed completed bins to the bar-code station so they could be checked into the ED Questionnaire Library.

Geographic Problem Resolution

The Census Bureau published census data corresponding to geographic boundaries in effect on January 1, 1980. Because field operations had to start using the maps in 1979, they reflected January 1, 1978 or January 1, 1979 boundaries. The Bureau used these maps to define ED's for the census. To maintain flexibility in aggregating collected data into geographic tabulations, the Bureau designed ED's so that they did not extend into more than one statistical or political area. Boundary changes made after the maps had been prepared required the Bureau to split many ED's so that census data could be published according to the actual boundaries that existed January 1, 1980. There were about 37,000 such ED changes.

Geographic errors found during enumeration required correction of geographic codes and/or movement of questionnaires from one ED carton to another. Splitting ED's involved the DO's, the processing centers, the Data Preparation Division (DPD) in Jeffersonville, and Bureau headquarters. The Geography Branch in DPD provided boundary corrections. DO clerks transferred these to the enumerator maps, divided address registers so that they would coincide with the new ED's, changed the ED numbers on the questionnaires and the storage boxes (usually by adding an "alpha" suffix to the original ED number), and separated the questionnaires into new boxes. At closing, the DO's forwarded the boxes of questionnaires to the processing center along with a list of ED's for which changes had not been completed. The processing centers could not directly check in some of the boxes of questionnaires because the ED numbers did not agree with the numbers on the central list showing revised ED's. Processing center clerks diverted these boxes from the normal check-in flow. (See above.)

Where possible, clerks at the processing centers reviewed geographic problems and made the corrections in the problem-resolution section of the check-in operation. When cases could not be resolved by these clerks, or when a geographic problem arose later in the 100-percent processing operations, the relevant questionnaires were referred to the Geographic Problem Resolution Unit (GPRU), where geographic specialists checked ED boundaries and numbers, validity of block numbers, and other geographic problems, and made the necessary corrections. Some of the other problems referred to the geographic specialists were: ED's that had been improperly split by the district offices; ED splits and block-number changes that were required after the district office had closed; block-number changes that had been missed or done improperly by the district offices; discrepancies between the block numbers shown on the address registers or questionnaires and those appearing in the master reference file (MRF); and ED maps missing from the address registers. The GPRU received a much heavier workload than anticipated. (A major reason for the increased workload was that some DO's (especially in Southern and Sunbelt States) closed without attempting to split ED's to reflect boundary changes, or to resolve some or all of the geographic problems that had been created or discovered during enumeration or the DO processing activity.)

CONTROL OF MATERIALS

Introduction

Each of the three processing centers received millions of questionnaires, thousands of address registers, and vast quantities of other records. To maintain control over these items, an automated inventory and control system (AICS) was created, using bar-code scanning as its major data-input system. (A manual control operation was used as a backup in case of failures in the automated system.) The AICS used bar-code scanning because of its ease in reading large quantities of data at a number of input control stations, each of which consisted of a cathode ray terminal (CRT), wand module (reader), modems, and, at three stations, a receive-only printer (ROP). There were 19 work stations at each processing office, each dedicated to the performance of a specific task in support of the overall system, such as check-in, library-in, and library-out.

Bar-code labels were printed both in house and by private contractors and subjected to quality-assurance (QA) procedures. The equipment necessary to the printing operation was a bar-code label printer, a CRT, and a keying station/console, operated in a remote-site terminal connected to a keying station under contract to the DPS. Correction labels were created through updates, additions, and deletions of ED (enumeration district) numbers in the data base. Additional labels were printed to replace missing, damaged, or unscannable labels. The bar-code label printer and associated hardware were manually operated.

Another control feature was the questionnaire and address register "libraries." The libraries provided a secure storage location for all materials; each ED had a location on the shelves in the libraries and always retained that location. This provided control (1) since only a small number of ED's had to be in the actual processing flow at one time, and (2) ED's could be found easily in their library storage location. The materials always were checked back into the library from any of the processing flows before being sent on to another. The libraries' operations were subjected to QA procedures, basically to minimize misfiling. (Three other types of libraries existed for the coordinated control of miscellaneous, reference, and film materials.)

Automated Inventory and Control System (AICS)

Introduction—The AICS tracked the movement of census materials from the time they arrived at the processing office through all phases of processing. As the material—ED boxes, address

registers, or film boxes—passed through the processing cycle, their location was monitored by having the information from the bar-code labels "scanned" and entered into the system.

In addition to capturing the workflow information, the bar-code station operators edited (reviewed for accuracy) each box's markings to ensure that the item being processed was correct. Although the edit functions actually were performed by the centralized computer, certain manual steps were required of the operator, who interacted with the system by following instructions on the CRT screen.

The General Operations and ADP Support Branches were responsible for processing work units (each consisting of the contents of a rolling bin); the General Operations Branch organized and controlled the work units and resolved problems, while the ADP Support Branch operated the ADP equipment.

Equipment—The processing centers had several different commercial systems for providing remote-job-entry (RJE) support to their AICS operations. Production consisted of printing the staging and transmittal records (STR's), processing-status and quality-control reports, work-analysis edits, and inventory reports for ED's and AR's, and transmitting weekly quality-control data to Bureau headquarters. With normal service and maintenance, time loss was limited to solving problems such as nonrecoverable tape-read/write errors and sudden equipment failures or power interruptions.

General procedures—Bar-code clerks were responsible for scanning the contents of work units entering or leaving their stations. The work unit (WU) could contain ED questionnaire boxes, address register (AR) books, or film boxes, depending on the assigned station. Each bin was considered a WU, except those with film boxes, where each film box was a separate unit.

A Staging and Transmittal Record (STR) was created for each WU and placed in a pocket on each bin. In addition, three work-unit number cards were put in a triangular holder on the top of each bin (this permitted the work-unit numbers to be read from all sides of the bins) and a "bin transmittal card" showing "unit to," "unit from," etc., was attached to the side of each bin. Whenever a WU was read at a bar-code station, the operator entered the date and his/her initial in the "out" or "in" column of the STR, and returned the STR to the metal pocket on the side of the bin.

When the automated system became inoperative in the course of the processing operation, manual control (described below) kept the work moving. During normal operations, communication within the automated system was by means of a direct connection between the timesharing network concentrator and the work station. If the concentrator became inoperative, emergency operation provisions went into effect to bypass it via alternative "dial-up" communications linked directly to the time-sharing service's main computer complex. Six of the bar-code work stations were designated as critical processing stations and were equipped with emergency "dial-up" capabilities. In the event of a failure, the operator would immediately notify his/her supervisor. The supervisor called the "Action Center," which would tell the supervisor the status of the system and the reason for the failure. (The reason for supervisory involvement was that various types of system failures could occur, and each situation required a specific procedure to be followed.)

AICS bar-code station operations—Automated data processing (ADP) supervisory personnel conducted training sessions for the clerks in this area with the aid of video films, training manuals, and on-the-job training with "hands-on" experience at the bar-code stations. Bar-code operators originally were hired to work mandatory 10-hour, 6-day work weeks when requested, but this requirement was later dropped because of the difficulty in locating personnel agreeing to work those hours.

Operator training began in July 1980, with 10 operators at each processing office involved in the first training program. Personnel from other ADP sections (Remote Job Entry (RJE), FOSDIC, and Camera) received cross-training in bar coding to assist in operating the bar-code stations. "Dry" runs were conducted continuously until the first DO shipment arrived for the check-in operation, and training sessions were conducted far enough in advance to allow familiarity with the task. ("Crash" training programs were conducted for additional personnel brought on board when required.) Originally, new operators were assigned to observe previously trained operations for 1 week, then assigned to their own stations. This observation period later was eliminated, and new personnel were assigned to a station for on-the-job experience.

At the start of the operation, the bar-code stations were set up in the following areas: ED Check-In, ED Library-In and -Out, Camera Prep, Camera-In, Camera-Out, Film Processing, FOSDIC, Address Register (AR) Library-In and -Out, Diary-In and -Out, and Evaluations. Station locations were adjusted as the emphasis of the 100-percent operation went from check-in to library to camera flow to diary to coding to evaluations, and so on.

Bar-code operations started in the first week of August 1980. At various intervals, 10-hour shifts were run, overlapping into the next shift to cover absences, backlogs, training, and retraining sessions.

The staff had great difficulty in reading peeling, crushed, torn, or bent labels. Many boxes did not have the protective plastic fronts, and some ED boxes collapsed after being stacked too high. Sometimes ED boxes were returned to the library with STR's, bar code labels, and search data found in the boxes themselves instead of on the outside.

Address register (AR) bar-code labels were placed on the upper right portion of the back of each register. This positioning made it difficult to scan because all books were not placed flat on a table prior to scanning; some labels became loosened

in handling. Although the AR library had less material than the ED library, it had more problems with unscannable labels.

There were not many problems with unscannable labels for film boxes; handling was minimal and labels had to be handwritten in cases of multiple film boxes for a camera unit since the second box was never scanned. "Recycled" film boxes had their tops torn off when they came out of film processing so they could be identified easily. All film boxes were checked for label and film-box integrity.

Acoustic couplers, used when required to transmit information over telephone lines, frequently broke down. There were some problems in maintaining the bar-code stations, since each bar-code unit consisted of different pieces of equipment (e.g., a short-haul modem (modulator-demodulator), wand modules, regulators, cables, and a cathode ray tube (CRT)). Each piece of equipment was serviced by a different manufacturer and interacted with other pieces of equipment. Technicians were not present on site, so a call had to be made to the servicing agency; a delay of 1 or 2 days was not uncommon. Other equipment had to be mailed to the supplier for servicing.

The Special Functions station was not included in the original plans, but evolved to handle (1) ED's with zero population and housing units (ZPH's); (2) removing and/or replacing geography-hold status; (3) running ED and WU information; (4) locating missing boxes in check-in; and (5) printing STR's.

Bar-code operations revealed a number of problems related to particular stations' activities and organization. These were corrected by modifying procedures and adding staff and equipment.

Bar-code label printing—The ADP supervisor provided general operational and procedural instructions to the processing offices' staffs regarding the operation of the bar-code label printer, which was turned over to the experienced computer operators originally hired to operate other remote-job-entry (RJE) equipment. The operators had three primary duties: Operation and maintenance of the equipment; maintenance of the production, equipment-maintenance, and supply logs related to the operation; and the formatting of data into the form required for printing labels. No formal training was scheduled or required. Operation manuals were provided, and all personnel received on-the-job training.

The equipment required for this operation included a label printer, a keying station, and a console. This initial production of labels (those printed prior to the arrival of ED questionnaire boxes and AR's) began in the second week of March and continued until mid-May. Some labels also were printed by private contractors, due to time constraints and the limited capacity of the Bureau's printing equipment. The production of label reprints (of those labels rejected by quality control (QC)) began April 3, 1980, when the last QC operation (see p. 12) was set up. Printing the initial film box labels started May 20, 1980, and was completed June 19, 1980.

Test labels (for testing the AICS and bar-code labels in practical application prior to processing) were formatted in the second week of June, and the printing started on June 20. Processing these labels was accomplished as the correction labels (those created through updates, additions, and deletions of ED's in the data base) were becoming available for formatting. Approximately 119,000 correction labels had been produced, covering almost all DO's, by August 13, 1980.

Printing replacements for missing, damaged, or unscannable labels began the week of June 9, and after August 13, all labels printed were replacements. The primary requesting unit was ED Check-In, for which about 35,000 labels were printed. Approximately 10 to 15 percent of all labels originally printed were replaced because they were unscannable.

After the printing of initial corrections and reprints, labels were matched with their appropriate printouts and sent to the Quality Control Unit. Replacement labels were keyed into the program, printed and attached to requests, and returned to the requesting unit.

The bar-code printer produced only six to seven labels per minute. Repairs or other required maintenance also caused delays; the response time for repair technicians was at least 3 work days and delivery of parts for the bar-code printer took between 2 and 4 weeks, even on priority orders.

Backup Manual Control Operation—In the event of an AIC system failure, a manual backup system was used. While in the manual mode, the bar-code operator verified the STR against the bin of work for all ED's listed. If no discrepancies were found, the STR was dated and the WU continued on to the next station. The operator annotated the WU numbers on the Recovery Log for the supervisor's "recovery" whenever the automated system was again operable.

Libraries

Introduction—The storage, maintenance, and cataloguing of materials at each of the processing offices was the responsibility of a system of libraries. Aside from the training library (discussed above in the section on training) and the film library (see p. 20 below), there were four documents libraries at each processing office—miscellaneous materials, ED questionnaire, address register, and reference materials. The functions of each of these units are described below.

Miscellaneous materials library—Census materials arrived by truck from the various district and other offices across the country. The trucks were unloaded and the materials sorted by type (ED boxes, address registers, and miscellaneous materials (e.g., used administrative forms, block header records, directories, and maps)) and placed on pallets or in rolling bins. The Receipt and Pallet Storage Unit stored the various materials until notified to send them to the appropriate processing unit. ED boxes and address registers were processed through their respective check-in units prior to being sent to the ED and

Address Register Libraries, while the remaining miscellany went to Miscellaneous Materials Check-In, where they were sorted and routed to the Miscellaneous Materials Library.

The materials were received at the library in rolling bins with form D-3328, Miscellaneous Materials Staging and Transmittal Request (STR), attached. Library staff verified the contents of each bin, checking it against the transmittal record; logged in the STR; sorted and counted the materials in each bin; and recorded the quantity received on the transmittal record. A copy of the record went to the keying staff where the information was keyed to the Master Inventory List (this list was arranged in district office (DO) order, and by form number within DO). The library control clerk then assigned shelf space for each bin of materials, and they were shelved in the library in the same sequence as the master list.

When a form D-3328 STR was received requesting materials from the library, the control clerk logged the request in the control log and, if the materials were available, they were brought to a temporary "holding area" before being sent to the requesting unit. (If the materials were not available, the STR was marked accordingly and returned to the requesting unit for resubmission later.) When materials were returned from a requesting unit, they were logged back into the library and reshelved.

ED questionnaire library—The questionnaire library at each processing office handled and stored approximately 30 million census questionnaires in 350,000 boxes. The questionnaires were sent to the library on a DO/ED basis as they completed ED check-in processing. Bar-code labels on the incoming boxes were scanned at a bar-code reader station to enter the identifying information into the computerized control system, the library control clerk logged in the arriving work unit, and the boxes then were shelved in ED order, by DO within State.

The ICB told the library when questionnaires were required for processing and produced an STR identifying the boxes of questionnaires to be formed into work units and sent for a specified processing flow. Each STR contained:

1. The "flow" (i.e., 100-percent microfilming, coding, sample diary, etc.) for which the materials were scheduled.
2. The work unit (WU) number.
3. The DO and ED numbers for all the boxes of questionnaires in the work unit.
4. The total number of boxes for the ED whose materials made up the work unit. (For all "100-percent flows," all boxes for an ED were included in the work unit being transmitted. For coding and sample "flows," only long-form questionnaires were sent.)

Upon receipt of an STR, the control clerk logged the request and assigned library clerks to assemble the materials. They identified and removed from the shelves the boxes of questionnaires required, stacked them in a rolling bin (or bins) in ED-number sequence, placed the STR in the pocket on the bin, and sent the bin to the control clerk. The control clerk entered the date the work unit was "staged" (i.e., assembled and ready to be sent to a processing unit), and released the work unit to the bar-code clerk for scanning before sending it to the requesting unit.

When work units of questionnaires were returned from a processing flow, they were checked back in through the bar-code reader station and given to the control clerk, who assigned the work unit (with STR attached) for reshelving. Once the boxes had been reshelved, the clerk involved returned the STR to the control clerk, who entered the date the work unit was reshelved on a control log and sent the STR back to the ICB.

Address register library—This library received conventional, master, and followup address registers (AR's) from the check-in unit. (These AR's contained the names, addresses, serial numbers, and types of questionnaires used for all housing units enumerated in the census, as well as the enumerator's maps.) The AR's were entered into the computerized control system by bar-code scan of their identifying labels, and then shelved in boxes in the library by DO and ED range. AR's identified during bar-code scanning as problem cases—e.g., extra AR's were present for a given work unit, or AR's belonging to a work unit were missing—were referred to the problem-resolution unit for corrective action.

Operational units requiring AR's for their work submitted requests through the ICB, which, as for questionnaires, generated STR's that identified the requesting unit and the AR's needed. When the library received an STR, the AR's requested were removed from their boxes, placed in rolling bins in sequential order, and sent to the bar-code reader station where their bar codes were scanned (to update the control system on their location) before they were sent to the requesting unit. Once the operational unit had finished with the AR's, they were returned to the library, their bar-codes were read again to check them back in, and the clerks returned them to the appropriate boxes.

Reference materials library—This library—one in each PO—housed all reference materials required for the coding operation, such as area-specific production coding guides, telephone books, city directories, maps, and so on. These materials, in conjunction with information from the questionnaires, were used to determine source information, verify addresses, etc. All reference materials were categorized and shelved according to type (place of work/migration (POW/Mig) by SMSA, generally in alphabetic (or numeric-code) order, and industry and occupation (I&O) by State).

The primary "customers" of the reference materials libraries were the POW/Mig, I&O, and general coding units. The coding unit (or other unit) supervisors requested materials as required and returned them to the library when they were no longer

needed. The libraries' control clerks maintained separate control logs for reference and training materials, and for administrative and other forms. The date requested materials were checked out of the library, the materials requested, and the date materials were returned, were entered in the logs. (Forms were not returned—they were "used up"—and the number requested was entered in the Forms Control Log.)

100-PERCENT PRETABULATION PROCESSING

Introduction

The 100-percent phase of the processing began when the PO's received the first complete shipments of questionnaires and other materials from the district offices (DO's) in August 1980, and continued until all the 100-percent data from all the short- and long-form (sample) questionnaires had been transmitted (see p. 23) to the Census Bureau's headquarters facility in Suitland, MD, and all diary review problems had been resolved. This task was accomplished on schedule in late December 1980, even though many district offices closed 2-1/2 to 3 months behind schedule. These data were used to reapportion seats in the U.S. House of Representatives. The 100-percent data, also had to be available at the smallest geographic levels under the provisions of Federal law (P.L. 94-171), which required the Census Bureau to furnish population figures for appropriate political and statistical subdivision to each State government that wanted them for internal redistricting purposes. The Census Bureau also needed the 100-percent data (1) to provide the analytical tools for evaluating the accuracy of the data and (2) for use as the controls for weighting the sample responses to reflect the total population.

After being checked in, the census questionnaires were microfilmed and the developed film was sent to the FOSDIC (film optical sensing device input to computer) unit. The FOSDIC device "read" the 100-percent data and entered them on computer tape for transmission to the Bureau's computer facility at the Suitland headquarters for editing and tabulation.

100-Percent Microfilming Operations

General information—After the questionnaires were checked into the library, they were designated in the AICS (see p. 13) as available for microfilming on a scheduled basis. STR's were generated that grouped ED's into camera units (a "camera unit" was a group of ED's that could be filmed on a single 200 ft. roll of microfilm) and camera units into work units. (Rolls of film were spliced together in the darkrooms to produce the larger continuous rolls the film processing equipment accommodated.) A roll of film (a camera unit) could contain material for more than one ED, but ED's were not split on two different rolls of film. Following the STR's, the library clerks loaded bins that were routed from the library through camera preparation and into the camera room. During the 100-percent microfilm flow, the 100-percent pages of the long forms and the short forms in their entirety were filmed. (Time factors prevented the microfilming of the 100-percent and the full sample questionnaires at the same time. The sample questionnaires required manual coding, and the Bureau could not do this and still have the 100-percent population counts to the President by January 1, 1981, as required by law. Thus, all of the 100-percent questionnaires and those pages of the sample questionnaires containing the 100-percent data were microfilmed first, to produce the apportionment counts. The sample questionnaires were microfilmed in their entirety after coding.)

After each roll of film was exposed, it was developed and checked for proper development quality and image density. If the film failed the quality control checks, the questionnaires for that roll were remicrofilmed.

While the film was being processed on FOSDIC, the microfilmed questionnaires were returned to the ED questionnaire libraries.

Camera preparation—Upon notification through AICS, ED work units (WU's-the contents of a rolling bin containing the questionnaire boxes) were routed to the Camera Preparation Unit (CPU). WU's arrived at the 100-percent camera preparation worksite either from the ED Questionnaire Library, containing ED's for 100-percent microfilming (new work), or from the 100-percent diary review for remicrofilming (i.e., ED's that failed the diary review operation and had to be remicrofilmed). The unit clerks prepared ED boxes of both long and short forms for the 100-percent microfilming operation, ensuring that (1) the WU contained the correct ED's in the proper box sequence, (2) a breaker sheet was in the first long-form box for each ED, and (3) that the ED boxes were grouped into camera units (CU's—i.e., the number of ED's sufficient to fill a complete roll of microfilm).

Upon arrival, the bar-code clerk checked each WU for validity. The clerk sent valid WU's to a control clerk, who logged the WU's in and routed them on to the breaker-sheet ID clerk, who located the correct breaker sheets (special sheets that listed each DO/ED, and a check digit) for the WU's and placed them on the bin. If an ED breaker sheet was missing, the ID clerk entered the notation "breaker missing" in the comments section on the STR and manually prepared breaker sheets for those ED's affected. An ED directory was used at the beginning of the operation as the source for the check digits needed in preparing the breaker sheets; this directory soon became outdated. Breaker sheet clerks frequently had to go to the Geography Unit to obtain the necessary information (the Geography Unit's directories were continually updated). If the information was not found there, a request was submitted through the ICB and the bin was held until a reply was received. The control clerk then assigned each WU to a camera preparation team.

The camera preparation team processed one ED at a time. A clerk removed the first long-form box for each ED, opened the

box, and verified the breaker sheet against the top questionnaire. The team verified the contents of each remaining box for the ED by checking the top questionnaire against the bar-code label. A CU breaker sheet was inserted into the first ED of each camera unit to identify the ED's in each CU. The WU then went to the Quality Control Unit, which carried out a sample verification of the contents of each bin. Any WU's with incorrect or missing breaker sheets or other materials were returned to the camera preparation team to have the problem(s) corrected. After a WU was processed by the camera preparation team and had passed the Quality Control Unit, it was logged out by the control clerk and sent to the bar-code clerk for scanning. Upon receipt of the "all clear" message, the WU was sent to the microfilming staging area.

When 100-percent camera preparation began operations, the camera unit consisted mainly of microphotographers. Because there was great difficulty obtaining new employees at that time, the day camera teams were asked to prepare the WU's for the night camera teams to film. Later, enough clerks were hired to meet the needed levels of staffing. Camera preparation was a physically demanding job and some employees hired as camera clerks were unable to perform the physical tasks assigned; several laborers had to be added to the units to assist in handling the materials and equipment.

Camera operations—After the 100-percent CPU performed all required operations on a WU, it was routed to the 100-percent microfilm operation. During the 100-percent operations, all short forms and pages 2 and 3 of the long forms—the 100-percent data collected on both types of questionnaires-were photographed. In addition, ED's requiring remicrofilming because of diary edit failures were combined into WU's and processed through the remicrofilming operations in a manner identical to the 100-percent flow. Camera units failing film-processing quality control checks (recycles) were returned to the camera room and the associated ED's were refilmed.

WU's for microfilming were moved to the microfilming unit's receiving area where the control clerk, bar-code station operator, and assistant control clerk checked them into the unit and distributed them to individual camera teams on a first-in/first-out (FIFO) basis. These WU's were staged in specific rows designating either 100-percent, remicrofilming, or recycle.

When a camera (there were 22 cameras at the Laguna Niguel office, 20 at Jeffersonville, and 18 at New Orleans) was available for 100-percent microfilming, the jogging clerk received a WU and the associated film box labels (FBL's) and bar-code labels from the pre-camera unit staging area. The jogging clerk removed the ED boxes associated with each CU comprising the work unit and verified the breaker sheet. As each CU was readied to be filmed, the jogging clerk handed the camera operator an FBL and bar-code label, and an ED breaker sheet for each associated ED. The jogging clerk removed the questionnaires for each ED box, verified the contents against the external label, and placed them in the jogging machine, which aligned the questionnaires for automatic feeding to the camera. The jogging clerk continued this process for each ED box in the CU. Upon completion of each ED box, and eventually the entire CU, the jogging clerk notified the camera operator and the unloading clerk.

The camera operator separately filmed the CU ID board (a board, filled out by the camera operator before filming a CU, showing the CU identification number, camera number, and date). Filming continued with the breaker sheet for the first ED, the first ED's questionnaires, the breaker sheet for the second ED, the second ED's questionnaires, and so on to the end of the CU. After the breaker sheets were photographed, the opened questionnaires were placed in a mechanical hopper attached to the automatic camera unit. The hopper fed the questionnaires onto a vacuum belt (the vacuum belt drew the pages of the questionnaires flat to ensure a proper image) that passed beneath the lens of the camera (called the camera head). Stroboscopic lighting illuminated each page for each exposure, achieving a "stop-action" effect that meant that the machines did not have to stop for each photograph. (This system was able to film up to 130 pages per minute per camera—a 50-percent increase in speed compared with 1970; in practice, the sustained rate for 1980 was closer to 80 pages per minute.) The unloading clerk removed questionnaires as they were filmed, placed them in their original box, and put the ED breaker sheet in the first long-form box for the ED. As each WU was completed, the unloading clerk returned it to the post-camera holding area. When the CU's filming was done, the camera operator annotated the film box label (FBL), placed a bar-code label on each film box, and the film in the box. As each WU was completed, the camera operator placed the film boxes on a tray located at the station.

The holding-area control clerk was responsible for the recording and staging of WU's, including delivering film boxes to film processing on a flow basis, keeping a record of filmed WU's and any recycles, and staging recycles for filming. Once informed by the outgoing bar-code clerk in the film-processing unit that a WU had passed film processing and was ready for release from the camera hold area, the holding-area control clerk had the WU returned to the ED Questionnaire Library.

Recycles—

The assistant control clerk periodically checked each camera station and removed the completed film boxes. The film boxes were then bar-code scanned and sent to the film processing unit, where the film was developed and subjected to certain quality checks, for such things as density and scratches. If the film for a CU failed the quality check, it became a recycle. The empty film box was returned to the camera room and the CU was refilmed. For recycles, the control clerk transcribed selected information from the original FBL to a new one, and placed the new label with the ED boxes for the camera unit to be refilmed.

The control clerk completed a transmittal at the end of each shift to cause new bar-code labels to be prepared for the recycles. The old film boxes were discarded.

Remicrofilming—

ED's that failed diary review (see p. 21) were remicrofilmed after their questionnaires had been corrected. The remicrofilming process was the same as that used for the original microfilming, except that all control documents used were annotated "100-percent remic."

There were several reasons why an ED might be remicrofilmed, including: two questionnaires being filmed on the same frame, questionnaires misaligned on the film plane, one ED box in a multiple-box ED being left out, breaker-sheet failure, and so on. During the 100-percent remicrofilming operation, the WU's were sent directly to the camera preparation team, which verified that the ED breaker sheet was in the first long-form (sample) box and that the remaining boxes for the ED were present. If the breaker sheet could not be located, a new one was prepared and placed in the box. After the remicrofilm CU's had been processed by the camera preparation team and had passed the Quality Review Unit, the control clerk logged out the WU and sent it to the bar-code clerk. Upon completion of the bar-code scan and the receipt of the "all-clear" message, the WU was routed to the microfilming staging area.

In some cases there were WU's that contained zero population and housing (ZPH) ED's; these were identified by a special label, and all ED's associated with the ZPH work unit contained only breaker sheets for 100-percent microfilming. These WU's were handled in the same manner as other WU's.

The 100-percent microfilming operation was completed by December 27, 1980. Puerto Rico questionnaires were filmed between January 7 and February 27, 1981. (Those for the outlying areas were processed with the sample; see below.)

Camera maintenance—For the most part, the 1980 microfilm cameras worked well and proved very reliable. Mechanical problems encountered involved dust, the main drive system, coated light-sensing photo cells, and decreased strobe light output. In the main paper-moving drive system, including the feeder and stacker systems, there was the wear, tear, and misalignment expected with such complex equipment. Failures occurred in three areas, however, where they were not anticipated—the bearings, the main-drive vacuum belts, and the main-drive brake shaft—all of which required frequent repair or replacement. In the camera head itself, a major problem was shutter failure. Because the camera head was such a delicate mechanical device, a relatively high failure rate had been anticipated and the only difficulty was keeping enough in stock to replace the ones that failed. There was a related problem with the camera-controller circuit board.

Film quality was affected by such things as density and belt marks. Dirty camera lenses and light filters caused a decrease in image density. Normally, if a film had a low density, the processing area staff recommended an increase in strobe light output to compensate. This continued until no more adjustments could be made on the strobe unit, after which the lens and filter were cleaned and a "step test" determined the right strobe setting. Light reflecting from wear marks on the main bed belt and belt plate affected image quality. Physical damage to the questionnaires prior to their arrival at the CPU also caused problems. Tears, curled or folded edges, smudges, and so on sometimes were the result of handling by respondents, but also were caused by improper packing or handling at the DO's or the processing offices.

Film processing—The Film Processing Unit developed all the film produced by the microfilming, remicrofilming, and recycling ED questionnaires, and performed quality control checks on the developed film. Camera units of ED questionnaires were brought to the Film Processing Unit from the Microfilm Unit on trays and the contents were checked in at the bar-code station for verification by the AICS by CU type, i.e., 100-percent, sample microfilm, remicrofilm, or recycles. After verification, each CU was sent to the film processor for development and quality checks on such matters as scratches, water spots, proper alignment of breaker sheets, and density readings.

Camera units that passed the quality checks were sent to the FOSDIC unit, while recycles went to the Microfilm Unit for refilming and then were returned to film processing for developing and quality checking. The old film was destroyed after quality-control clerks completed evaluations on the type of failure. During the course of the operation, the CU's were tested against FOSDIC specifications to maintain acceptable levels of developed film. Whether the film rolls passed or failed the quality control check, the bar-code labels on their boxes were scanned and verified against the AICS data base.

100-Percent FOSDIC Processing

General information—After CU's passed film processing, they were sent to the FOSDIC unit. In the first stage of the 100-percent FOSDIC processing, the negative microfilm was "read" by the FOSDIC system, which detected filled-in circles (appearing as clear spots in specific places on each microfilm frame) on the breaker sheets and questionnaires that indicated responses or identification information. Each breaker sheet was scanned for specified information; if this was not complete, the breaker sheet and the entire ED were rejected. If the data were complete, the individual questionnaire pages then were scanned for responses. FOSDIC converted the coding marks into digital codes and electronically transmitted them in "real time" to the Census Bureau's central FOSDIC concentrator at Suitland, MD, where they were "logged" in and stored on computer tapes. Computers performed minor edits, imputed certain missing data, and generated the review diary (see below).

FOSDIC processing of the 100-percent data took place between August and December 1980. At each processing office, the FOSDIC Unit's responsibility was to transmit the data stored on the film into the computer system at Census Bureau headquarters using FOSDIC 80 computers. The computer technician at the processing center communicated with the concentrator (receiving) station in Suitland to connect the FOSDIC units for the electronic transmission of data. The FOSDIC operator loaded the computer programs from floppy disks into the processing office's computer following the instructions in the manual. The operator mounted the microfilm on the FOSDIC; typed in the DO code, camera unit, and the number on the computer console; and began transmission of data. Upon a successful transmission of a film roll, it was bar-code checked out of the FOSDIC Unit and into the Film Library, where it was logged in and stored.

Staffing and training—ADP supervisory personnel conducted formal training sessions with the aid of video film and manuals and on-the-job training with the assistance of the computer technicians. The supervisor's training consisted of classroom sessions in census orientation, processing or FOSDIC operations, bar-code training, and training instruction. There was also on-the-job training. The operators were trained by the FOSDIC supervisor and the computer technicians, with hands-on training and manuals as reference guides. Because only experienced computer operators were hired, minimal training was necessary.

Each FOSDIC unit consisted of one supervisory computer operator and four computer operators—two per shift (the FOSDIC supervisor usually worked the "day" shift, while the general shift supervisor handled the "night" shift). Four FOSDIC machines were installed at each processing office in an environmentally controlled room and located so that an operator could run more than one machine at a time. Space was allocated for staging areas and necessary office equipment. During normal transmission hours, on-site computer technicians were available in an adjoining room.

FOSDIC operations—FOSDIC 100-percent film transmissions started in the first week of August 1980 at all three processing offices and the last roll of film was transmitted December 29, 1980. The FOSDIC program to transmit Puerto Rico microfilm was completed late in February 1981.

A microfilm input/output control area was designated within the FOSDIC unit to indicate which film boxes had been checked into the unit and were ready to be transmitted. When transmission was completed, the operator initialed the corner of the film box label that contained the DO and ED number. Transmitted-film boxes were then placed in the input/output control area designated for film boxes to be bar-coded out of the FOSDIC Unit.

There were various problems in the FOSDIC work area. Film labels were sometimes damaged or obscured, lacked information, or did not agree with bar-code labels. The supervisors returned these film boxes to the Camera Room supervisor for correction. When the problem was resolved, the film boxes were returned directly to the FOSDIC Unit. Film was at times incorrectly wound on the reel, either backwards or upside down; it occasionally was damaged during transmission. The supervisor returned such rolls of film in their boxes to the film-processing supervisor for rewinding or refilming. There were some problems with modems, power sources, and transmission. Console messages on teletype indicated when any of these problems occurred. The computer technician would resolve the problems if they were local, or would notify Bureau headquarters if the responsibility lay there.

FOSDIC maintenance—Electronic technicians were hired and trained at the New Orleans processing office for both the New Orleans and Laguna Niguel sites (existing staff at Jeffersonville handled the FOSDIC equipment there). Once FOSDIC operations began, the technicians were responsible for equipment installation, new program implementation, preventive maintenance, repairs, and operator assistance and instruction.

Upon completion of training in mid-March, the technicians joined their respective processing office staffs and installed the equipment. Testing and resolving all the hardware problems continued into August, when processing of 100-percent microfilm began. The technicians were assigned to FOSDIC shifts as needed to provide maintenance and technical support.

Film Library

Once the rolls of microfilm had been processed by the FOSDIC Unit, they were sent to the Film Library for storage. Each roll in its own box with a bar-coded identification label attached was routed on a flow basis. The control clerk checked them through the library's bar-code scanning station, logged them in, and shelved them.

The microfilm storage shelves were divided into two groups, one for "100-percent" and the other for "sample" microfilm. The control clerks allocated shelf space by DO and State, and shelved the microfilm boxes in camera unit (CU) order within DO. The libraries received the first rolls of film for storage early in August 1980. Since these were in random DO/State order, there were continuous minor rearrangements as allotted space was taken up and DO/State groupings overlapped other groupings' space. The last film for the 50 States was stored in the libraries on December 29, 1980.

Only the FOSDIC Units, or the Film Duplication Unit at the Jeffersonville office, could request microfilm from the Film Libraries. Such requests were made through the ICB, which prepared Special Request STR's (form D-1331) and sent them to the libraries as required. The control clerk located the microfilm roll(s) requested and entered the CU number for the film, the date of request, and the requesting unit's acronym on the Film Library Request Log (form D-3281) before releasing the film to the bar-code station to be checked out. When the

microfilm was returned to the library, the control clerk updated the STR to show that the film had been returned and filed the STR in the "Special Requests Completed" folder, then returned the microfilm to its designated shelf area.

Diary Review

General information—After the 100-percent data were put on computer tape, and again after the sample data were entered, the counts for each ED had to pass a set of acceptance tests to make certain that data scanned by FOSDIC had not been lost or incorrectly recorded on tape, and that the potential errors or unusual entries did not exceed established tolerances for population, housing units, or various population and housing characteristics. Essentially, this involved comparing the initial computer counts with the 1980 field counts. The data that failed were summarized and printed out for each ED in a format called a "diary." The processing center clerks compared the data on the ED diary with the original questionnaires, address registers, and/or the microfilm to make certain that all forms were in good shape (not crumpled, too lightly marked, etc.) and properly identified, and that none had been missed during the filming process. For instance, the clerks might count the number of questionnaires in an ED box and then see if the same number had been photographed. When necessary, rejected ED's were remicrofilmed and sent through FOSDIC once again.

As it had in the 1970 census, the Bureau applied item-by-item tolerances as parameters in the FOSDIC program, so that any one (or all) could be changed during the census processing. Thus, once these changes had been made as a result of early review, the headquarters specialists concerned themselves more with such things as (1) systems errors that caused responses to be lost or incorrectly coded on the tape, and (2) a number of potential errors (for example, an excessive number of similar responses, such as "Other" to the race question). Inconsistency between the field and machine counts was a frequent reason for an ED to fail diary review. Geographic problems, such as an improper ED split, or ED's with missing or inappropriate block numbers, also caused ED failure in 100-percent diary review. (An ED had to be split when it was discovered that it was affected by boundary changes (see p. 13) or when more households and/or housing units were counted in an ED than could be processed in a work unit on the computer.) The cost for all diary review—100-percent and sample—was about $4.5 million.

Diary review staffs were established at each of the processing offices, each consisting of an operations supervisor, a central control clerk, a processing analyst and one or more assistants, and a minimum of 8 to 10 clerical diary review units, each with its own supervisor, lead clerk, unit control clerk, and approximately 15 review clerks. Review clerks and the unit control clerks received formal training, using a videotape instruction program and exercises simulating the clerical tasks. The Diary Review Unit supervisors were responsible for providing staff on-the-job training.

The 100-percent diary review began slowly at all three offices in the first week of September, building quickly as the workload mushroomed with the concentrated delivery of materials from the DO's, and was completed late in December 1980.

Procedures—After the information on the questionnaires from an ED was transmitted to the Suitland computer facility via the FOSDIC operation, the data were computer-edited and the results returned to the processing offices in the form of "accept" and "review diary" listings (transmitted to the the remote-job-entry (RJE) terminal rooms at each office several times each day). The "accept" listings show the ED's that did not require diary review, and which remained in the ED questionnaire library available for other processing operations if necessary. The "diary review" listings identified the ED's for which the computer edits detected errors requiring investigation and/or correction. This information was also entered directly into the AICS via computer tape.

The central control clerks for the the Diary Review Unit at each office picked up the listings at the RJE rooms several times daily and distributed them to the review staff by DO (all the materials for a given DO usually were reviewed by a single unit). The Information Control Branch (ICB) at each office also received the STR's through the AICS, and routed the required ED questionnaire boxes and address registers in rolling bins from the various libraries to the diary-unit central control clerks. These clerks routed the bins through the diary review staff barcode reading station, where the bins' bar codes were read to update the AICS on the location of the materials, and then sent the bins to a holding area until one of the reviewing units requested the materials.

The control clerk in each reviewing unit matched diary listings assigned to that unit to the corresponding ED questionnaire boxes and address registers (AR's), placed the listing inside Box #1 of the ED boxes, the AR on top of the box, and placed the boxes on the reviewing unit's "ED's for assignment" shelves for easy access. The unit control clerk assigned ED materials to clerks for review as needed.

The review clerks were organized to perform the following specific types of operations:

Form counts—When the housing units and/or persons tabulated by computer for an ED were fewer than expected, a form count was required. The form count clerk(s) counted the number of questionnaires in the ED boxes and compared that number with the minimum number expected.

Block code review—Block code review included comparing block numbers for selected serial numbers on the diary listing to the block numbers in the AR. When the block numbers differed, the correct AR block number was entered in the diary. If enough block numbers on the listing were different from the numbers on the AR, the questionnaires involved were located and the questionnaire block numbers were edited.

Write-in review—This review dealt with the three 100 percent population questions requiring write-in responses (relationship, race, and year of birth). A diary review entry was made for each serial number (i.e., questionnaire) for which the computer edit program did not find a code for one or more of these items. The number of corrections required for each serial number was recorded in the diary.

Address register/diary (AR/diary) review—AR/diary review was carried out for ED's, previously reviewed by a processing analyst, that had significant differences between "edited" and "field" counts of population and housing units. The AR/diary clerk(s) compared the information from section IX (review operations) of the diary listing with information in the AR and recorded any discrepancies on the diary. Differences in block numbers, types of living quarters, and numbers of persons were noted for matching to serial numbers; serial numbers appearing only in the diary were noted, while those for addresses in the AR were written on the diary with their block numbers, type of living quarters, and population numbers.

Worksheet review—Worksheet review was done only for ED's routed to an AR/diary clerk. The worksheet clerk tallied the differences reported by the AR/diary clerk and summarized the results on a worksheet. Significant differences between the AR and the diary required a questionnaire edit and remicrofilming of the ED.

Questionnaire edit—This edit was done only for ED's subjected to AR/diary review. The edit clerk checked questionnaires with serial numbers that the diary listings indicated required review. (These were identified by handwritten entries and/or by block number, serial number, or population-number suffixes on the diary.) The diary information on these serial numbers was compared with the corresponding questionnaires, and the clerks used editing tables to make corrections to the questionnaires, diary, and/or the AR.

Group quarters[2]—ED's with significant differences between the edited and field group-quarters population counts were reviewed by the group quarters clerk, who compared the information in the diary listing with that on the AR and entered any discrepancy on the diary. Significant discrepancies required a questionnaire edit and remicrofilming.

One or more clerks in each diary review unit were assigned to each of these functions. Each clerk received review assignments from the unit control clerk. When each job was completed, the clerk indicated further action (if any) to be taken in section VII on page 1 of the diary review listing. If changes were not needed, or were so slight as would result in a negligible change in the data for the ED, the clerk circled the word "Goldplate" in section X on page 1 of the diary review listing and initialed the page. "Goldplate" ED's were "accepted" and did not require further review; the "Goldplate override" was keyed and the diary flag removed so that the ED was available for further processing.

Materials for diary review might have to be reviewed several times by different clerks before passing out of the unit entirely. For example, an ED that underwent an analyst's review (see below) might have to undergo an AR/diary review and a questionnaire edit as well.

When the individual clerks completed their parts of the review, they placed the ED boxes and/or AR's on the "materials check-out" shelves in the unit for staging to the appropriate destination—either to another review clerk or outside the review unit. Remicrofilming and "Goldplate" materials were collected in rolling bins, by DO, for staging, while materials requiring unusual corrections or changes were sent for procedures-analyst review.

Referrals—Clerical review procedures did not cover all possible problems and specified cases were sent to the diary review unit supervisor or to the procedures analysts for resolution. Supervisor referrals included ED's with damaged or missing questionnaires, serial numbers not found or cancelled in the AR's, questionnaire edit and group-quarters referrals, Spanish-language questionnaires and other forms, geographic problems, and control-clerk referrals. The supervisor reviewed the referral cases and determined what actions were needed.

The procedures analyst had to deal with three major types of referrals: (1) Group-quarters problems, (2) ED's with clerical errors, and (3) "other" referrals. Groups-quarters referrals to the analysts were those not covered by the supervisors' instructions. Normally, the attached "shuttle card" had the information required to reconcile discrepancies in the data, but if not, the analyst had to decide how to resolve the problem based on his or her own experience and general census procedures. Materials with clerical errors required a review of the diary listing and associated questionnaires, and correction as necessary. "Other" referrals usually were from diary review unit supervisors seeking advice or assistance in resolving particular referral problems of their own.

Quality review—A quality-review program was used in the diary review units to detect and correct problems in clerical performance, procedures, or the training program. Each unit's lead clerk was responsible for daily quality checks on the performance of each review clerk. The lead clerk, sometimes assisted by the procedures analyst and his/her assistants, checked the first few ED's processed by each review clerk in each functional position. Review clerks completing two successive acceptable ED's with the same review action (i.e., AR/diary,

[2]Group quarters included institutions such as hospitals and jails, and non-institutional group quarters such as missions, dormitories, and other living quarters shared by nine or more persons unrelated to the person listed in column 1 on the "first form" questionnaire.

block code, worksheet, etc.) were considered qualified for that review action. Thereafter, one example of each qualified clerk's work was checked daily, unless a clerk was assigned to a different review action, in which case he or she had to be requalified. A clerk having two or more diaries rejected for quality reasons out of 10 consecutive diaries was disqualified and assigned for retraining in problem areas, as well as "warned." Any clerk receiving two disqualifications in a 30-day period was reassigned to write-in or form-count clerical review (considered less demanding than the other positions) or, if already in one of those positions, was removed from the diary review staff.

Diary review closeout—The Census Bureau is required by law to complete the final census population counts needed for congressional reapportionment, and to transmit them to the President within 9 months after the census date. To meet this requirement, the agency developed a schedule of proposed closeout dates for processing the data from each State, so that at a specified point in processing each State's data, the 100-percent data corrections could be halted.

The first States closed out through diary review were Vermont (October 28) at Jeffersonville, Delaware (October 29) at New Orleans, and Hawaii (November 24) at Laguna Niguel.

The 100-percent data processing at the processing offices originally was scheduled to close down on December 15, but by late October it was obvious that the late closing of the field offices and the attendant delay in processing could change this date. The Decennial Processing Staff (DPS) began transferring personnel within the offices from coding and other activities to concentrate on the 100-percent operation. Actions of persons and institutions outside the control of the Census Bureau caused some of the delay, notably in completing local review of some ED's and resolution of ED's in several major cities involved in litigation concerning the enumeration. Within the diary review operation, three principal problems were encountered: (1) "Goldplate" ED's that were not promptly sent out of diary review; (2) ED's scheduled for remicrofilming that the AICS showed still were in diary review; and (3) an undetermined number of ED's sent for remicrofilming that were returned to the ED questionnaire libraries instead. These difficulties were primarily the result of work backlogs caused by delayed delivery of materials and higher-than-anticipated rates of corrections required. The AICS proved extremely useful in locating materials that had been misrouted or delayed in movement, and the processing offices were able to address the problems relatively easily. No major changes in procedures were required. The last States to complete diary review at the New Orleans office were Florida, Louisiana, Texas, and Virginia—all on December 20. Jeffersonville completed diary review of all the States in its processing area except New York by December 13. New York was delayed because of the reenumeration of the Bedford-Stuyvesant section of Brooklyn (see ch. 5), but diary review of the State was not completed until December 24. The Laguna Niguel diary-review operation closed out the last three States handled there—California, Missouri, and Oklahoma —on December 28.

SAMPLE PRETABULATION PROCESSING

General Information

This section describes the processing of the sample data derived from about 15 million long-form (sample) household questionnaires. The 100-percent and sample responses were processed in the same manner, except that handwritten answers to many sample questions had to be converted into machine-readable codes. Because detailed data classifications were needed for a number of the sample items, such as income, occupation, industry, place of work, language, and ancestry, respondents had been asked to write in exact answers instead of marking a choice on a list of possible responses. Coding these handwritten responses was the most time-consuming and expensive procedure at the processing centers, involving about 3,000 clerks and $27.2 million between January and October 1981.

Three separate sections of clerks did the coding. One section worked solely on the place-of-work (POW), travel-time-to-work, and migration questions (known collectively as "POW/Mig"); a second dealt with the industry and occupation (I&O) answers; and a third section coded all other general items, such as place of birth, language, ancestry, income, homeowner costs, and the like. Using various reference materials (e.g., coding guides and telephone and ZIP Code directories), the clerks determined the codes for the handwritten responses and then filled in the appropriate circles in the designated code spaces on the long-form questionnaires. (See ch. 12 for illustrations of the individual items and their coding boxes.)

Because any large clerical operation produces errors, a quality control operation checked the clerks' work. Specialists encoded selected questionnaire samples for verification purposes. At times, this process involved comparing separate codings of the same data and, when the error level was deemed unacceptable, correcting the errors. Depending on the workflow, backlogs, and problems encountered, a group of questionnaires could stay in the coding sections for 6 weeks or more.

Once the sample questionnaires for a group of enumeration districts (ED's) were coded, the sample data were transferred onto magnetic computer tape via the same two-step system that was used for the 100-percent data: The questionnaires were grouped by ED and microfilmed by specialized high-speed cameras. Then FOSDIC (film optical sensing device for input to computers) scanned the microfilm and converted the coding marks into digital codes. (See p. 19.) The four FOSDIC machines in each processing center transmitted the sample data to Suitland, MD, between July and December 1981.

Because of budget constraints, the Bureau decided to slow down the sample coding operations beginning in early March 1981 and stretch out the work into the next fiscal year (beginning October 1, 1981) by reducing the staff. For the same reason, it was decided to code the POW/Mig responses on only half of the sample questionnaires, thus reducing the sampling rate for three items (but increasing their sampling error by 40 percent). When the budget situation improved in June 1981 with the appropriation of supplemental funds, coding was accelerated by restoring staff, but the POW/Mig coding reduction was retained.

Clerical Coding of Handwritten Responses

Coding operations began with the receipt of ED's from the library. Whenever possible, POW/Mig and I&O coding were scheduled independently, but the materials for both were grouped at the State or SMSA (standard metropolitan statistical area) level rather than at the ED levels needed for general coding.

Each sample questionnaire requested information on up to 7 persons, with a possible 39 questions for each. Of these, about 15 called for written-in answers. POW/Mig coding involved 2 of them; I&O assigned codes to 4 from 503 possible codes; and general coding was responsible for the remaining handwritten responses, including the 7 possible for the housing unit. In some instances, the coder had to make simple calculations to arrive at the proper code, such as converting a monthly income figure into an annual total. The general coders were also responsible for affixing a piece of black tape in a designated place on the last page of data for each sample questionnaire. (This "shadow bar" tape, detected by an electric photosensor on the automatic camera unit, triggered the document-transport mechanism to move the completed questionnaire off the camera bed and position a new questionnaire for filming.) A special clerical unit separated and marked a FOSDIC circle on the sample questionnaires not coded for POW/Mig so the FOSDIC operation would accept them.

Constraints on the sample coding operations—There were several delays in the coding operations. Coding was scheduled to begin with a gradual buildup of the staff in October and November 1980, with full production to start by January 1981 and be completed in June or July 1981. However, staffing did not begin until January 1981, and the full complement was not operational until March. As noted above, budgetary problems then forced reduction of the coding staff by approximately one-half, thereby extending the schedule even further. By the time the staff had been restored to full strength in June, the target date for completion had slipped 3 to 4 months. Part of the reason for the delay was the long time necessary to train a production coder and have that person reach maximum efficiency. The trained coders released in March often were not available for subsequent rehiring, so that new ones had to start at the very beginning of the training and coding process.

The overall extension of the coding schedule inevitably meant delaying publication of the sample data. To meet user needs, the Bureau decided to process and tabulate a 1-percent national sample of population and housing data ahead of all the rest. This "Early National Sample" (see ch. 8) had high priority and caused minimal disruption of the normal coding operations as selected ED's and reference materials moved through the system.

Quality Control

"Dependent" and "independent" verification procedures in conjunction with the sample coding operations maintained quality control of the production coders' work. In "dependent" verification, the quality-control coder, called a "verifier," saw the production coder's work and potentially could be influenced by it; in "independent" coding, two coders, who did not see each other's work, coded the same questionnaires, and their work was compared.

The general coding operation used dependent verification: A verifier first selected a sample of questionnaires that a production coder had processed. The verifier then marked on the quality-control record whether he/she agreed with the production code; if not, the correct code(s) was entered on the form and the one(s) on the questionnaire was changed.

The POW/Mig and I&O coding operations used independent verification. Here, a "precoder" coded the responses on a selected number of questionnaires onto a special form. Next, a production coder assigned the codes directly onto the questionnaires. Then a matcher retrieved the forms and the relevant questionnaires and transcribed the production coder's decisions onto the precoder's form. If they matched, no further action was necessary; if they did not, a postcoder dependently coded the response and entered that code on the precoder's form. The three codes were compared; the two that matched were considered correct and the odd code was charged as the error. (If none of the codes matched, no error was charged.)

An acceptable error rate for POW/Mig coding was 5.25 percent on an item basis. If a coder's work units exceeded this rate, he/she was warned. If the rate was exceeded on three out of any five consecutive work units, the coder was retrained. If retraining was required a second time within 20 work units, the coder was to be removed from the operation.

Production standards, set 5 to 6 weeks after coding began, ranged from 47 sample persons per hour for large SMSA's to 100 sample persons per hour for non-SMSA areas. Coders were timed again after these standards were established, but no significant differences were detected.

Microfilming of Coded Questionnaires

Five months elapsed between the end of 100-percent microfilming and the beginning of sample microfilming. By then, roughly 90 percent of the camera operators and many of the

supervisory personnel had either left the census or were engaged in other work, so that a practically new work force had to be organized. Recruiting two operators for each camera proved difficult, particularly since the microphotographers' positions had been changed from wage grade to clerical, effectively cutting pay in half. Those operators that were hired, many of whom now were general clerks, received 2 days' on-the-job training from experienced operators, using practice questionnaires. Fast learners were teamed up with trainees that required additional instruction. Arrangements were made with the ED library concerning the number of work units it would release each day, and logs were set up to control movement of the color- and bar-coded work units as they were processed and to record progress through preparation and filming. Production was low at first, but with relatively few recycles, it rose weekly. As more staff were assigned, the former trainees became the trainers.

After coding and quality control, the sample questionnaires, including the pages already photographed in the 100-percent microfilming process, were microfilmed in their entirety. As noted above, sample microfilming followed the same basic procedures as the 100-percent operation, except that an automatic page-turner was used. When a sensor detected a piece of black tape on the last completed page of a questionnaire, the document-transport mechanism ejected the questionnaire and brought a new one into position under the camera lens.

Several changes were instituted in the camera-preparation operation for the sample. The two-person teams were broken up, so that each clerk worked separately. A special clerical team prepared the density sheets (identifying the district office and film roll numbers) for the camera operators, so the operators no longer had to process these sheets in their darkened work areas and could concentrate on camera production.

The first test run of sample microfilming began in mid-May with all the ED's for Montana, to see what personnel needs might be for the operation. The Montana work units, however, were in almost perfect readiness, with the forms in the ED boxes evenly placed, almost every sheet in proper position for filming, and nearly all the breaker sheets in their assigned boxes. The second State, Wyoming, proved to be more typical, with torn and partial forms, too-heavy taping, breaker sheets missing, and the like. Correction of these conditions sometimes introduced other problems, such as serrated edges or cuts or mars on the documents, that caused loss of production. Camera operators helped the preparation clerks as needed until there were sufficient work units for the cameras. Unit supervisors maintained daily diaries detailing the work done.

By mid-July, roughly half of the cameras were in full-time operation and most of the Early National Sample had been processed. The ED library began to increase substantially the number of work units released for camera preparation, leading to the need for more area for storage and longer work hours—10 hours a day for both camera preparation and processing. Work continued at an accelerated pace throughout the summer of 1981. The first work units for the outlying areas (which did not have a sample but were processed at this stage) arrived in the camera area in early September. They, together with the Puerto Rico sample, were virtually all microfilmed by the end of November 1981, when the nonsupervisory camera personnel were released.

Various problems were encountered that slowed the sample microfilming operation. Shadow bars (pieces of black tape) on the questionnaires sometimes were absent or misplaced and the questionnaires themselves had been packed in a haphazard manner. Breaker sheets occasionally were absent, incorrect, or mixed in with the accompanying questionnaires. Boxes of ED's that coding units had referred to analysts for problem resolution sometimes found their way into camera preparation instead. Voltage fluctuations required replacement of fuses and relays.

Film processing, as described on p. 19 above, followed.

Film Library

File cabinets were relabeled to accommodate sample microfilm, which required 40 percent less storage space than had been necessary for the 100-percent film. A remote printer, used with a bar-code station, replaced three control clerks and proved to be a faster and more effective method of controlling and recording data. Otherwise, responsibilities were the same as for the 100-percent film.

The film libraries received the first rolls of sample film for storage in mid-May 1981 and the last by mid-December. The film library supervisor filed them on a continuous basis and encountered no major problems or backlogs. On November 10, 1981, operations personnel began film quality control (QC) and shipping. Three separate shipments, on November 17, December 1, and December 17, were made from Laguna Niguel and New Orleans to Jeffersonville. There was a delay in the receipt of the computer listings from headquarters; otherwise, there were no problems encountered in meeting deadlines.

Sample FOSDIC Processing Operations

FOSDIC sample-data processing consisted of transcribing the encoded responses to a magnetic tape, with review and clerical repair taking place after computer editing. All other FOSDIC operations for the sample data were the same as those for the 100-percent data (see p. 19).

One supervisory computer operator and a computer usually constituted the entire operation. Bureau headquarters supplied the necessary programs, which were stored on "floppy" disks and used when transmitting the data for a particular area—a State or (in the case of Laguna Niguel) Puerto Rico or an outlying area. No other special preparation was necessary.

Sample-data processing on FOSDIC began in mid-May 1981. Transmissions were intermittent through July and into August but intensified thereafter, reaching their peak in October. FOSDIC operations were completed and shut down during the second week of December 1981.

Control of the boxes of sample film was handled in the same manner as for the 100-percent film, and film processing differed only in the programs used. The total volume handled during sample FOSDIC processing equalled 57 percent of the 100-percent processing workload.

Sample Diary Review

Diary review here was performed in much the same manner as for the 100-percent data (see p. 21 above), except that it involved far more detail given the number of data items being tallied and cross-checked. Sample diary review did not deal with population and housing counts, but rather focused on the presence or absence of written-in entries, and on cases where the FOSDIC system had not detected a code marking—either because of failure in calibration or faulty film processing. When the ED-by-ED review revealed an excessive number of errors, clerks had to correct them manually. Diary review for the sample began in June 1981 and ended in December 1981.

OTHER PROCESSING CENTER OPERATIONS

Automated Inventory and Control System (AICS) Operations

Label printing—Film-box label keying and printing for the sample began in the second week of April 1981; any labels that the quality-control operation rejected after scanning them for validity were recycled through the printing system until accepted. After this, production turned to the ongoing function of replacing labels for address registers and ED and film boxes. An average of 50 replacement labels a day had to be generated. All labels carried district office numbers and completion dates, and production logs were maintained for them. Replacement labels were sent to their requesting units.

The equipment problems that had hampered the 100-percent label-printing operations (see p. 12) had been resolved, and the label printers were not subjected to the same workloads and extended periods of operation necessary before. Lower frequency of problems and loss of time while waiting for service and parts appeared to have a direct relationship to the lower production requirements. The labels were printed far enough in advance of the sample camera operation that the limited printer speed—six to seven labels per minute—and temporary losses of system accessibility were not significant handicaps, but some reprinting was necessary because of computer programming problems, insufficient equipment cleaning and maintenance, and the use of overage print ribbons.

Keying Diary Review and Other Programs

Each processing office had a special area for keying operations. It normally housed 30 or so keying stations, 2 tape drives, 2 line printers for receiving transmissions, 2 disk drives, a small tape library, and a fairly large document-staging area. Keying personnel, including control clerks, were trained in a variety of ways. New keyers were hired as needed, and when a night shift had to be added, it usually was composed of ADP (automatic data processing) personnel specially trained for particular operations.

Diary review—"Diaries" were computer-generated listings of instances where the data for ED's and on individual questionnaires within them did not meet established tolerances for the collected data. In "diary review" (see p. 21), clerks examined the listings, compared them with the source documents, and made corrections or repairs as appropriate. This could include remicrofilming all the questionnaires in a given ED and repeating the subsequent processing. Actions that did not require processing were reported through keying, such as the following:

Goldplate—The ED was to be accepted on the current cycle, because no significant improvement would result from processing it again.

Revert—Data on the diary had been edited in a cycle prior to the latest one because the ED had gotten into the wrong processing flow (e.g., to the camera instead of the library).

ZPH—In 100-percent processing, this indicated an ED with zero population and housing; in sample processing, it meant that no sample data had been collected.

Keying for 100-percent diary review took place between September and December 1980; for sample diary review, it began in June 1981 and ended in December 1981. The diary-review data were keyed to tape and transmitted to headquarters daily.

Post-enumeration survey—The 1980 PES program (see ch. 9) employed sample-survey methods to measure directly the components of census error for a sample of persons, and by this means to estimate the net error for the census. It involved (1) matching information collected in the periodic Current Population Survey (CPS) taken in April and August 1980 with the census to see whether the persons in the CPS households were also enumerated in the census, and (2) interviews of approximately 100,000 enumerated households chosen by sampling the census records for about 10,000 ED's and generating a control list by computer. The clerical operations were carried out in the three processing centers beginning in September 1980 and required access to the prelist, master, and followup address registers, and to the census household questionnaires themselves. Clerks located the CPS and PES sample addresses in the census registers, identified their census serial numbers and form types, located the appropriate questionnaires, prepared interview forms and sent them to the appropriate regional offices, received the completed forms, and

matched the sets of CPS, PES interview, and census records. The match results were edited and batched in groups of 99 or fewer documents and forwarded for keying.

The data on the source documents were keyed twice, independently, and transmitted through the Bureau's communications system to headquarters, where a computer compared the two sets of data and generated a "correction listing" showing the instances where the two keyings were not identical. Keying instructions changed frequently as analysis revealed faults in the procedures. Clerical resolution, keying, transmission, and computer editing continued in cycles until the file reflected actual differences between the census and survey data. The bulk of the keying was completed by February 1981, and most of the staff were assigned to other work by May 1981.

Other programs—To provide management with quality and production information, data from both precode and code records were keyed to tape and verified daily, and transmitted every Friday between December 1980 and October 1981. Often, keying was the fastest way to ask for and provide information on address registers and ED boxes. Initial requests for that sort of keying began in November 1980 and continued to mid-May 1981.

Count Review

After the apportionment totals for each State had been delivered to the President at the end of December 1980 and some of the preliminary and advance census reports had been issued (see ch. 8), processing center clerks reviewed the 100-percent ED population and housing counts within 40 of the 50 States by comparing them once more with the preliminary figures the district offices had prepared. Significant differences were investigated and reconciled, usually by correcting discrepancies in geographic-area designations, allocation of population and housing units to ED's, and the like. These corrections, resulting in changes to within State totals but usually not in the State totals themselves, were carried into subsequent tabulations.

CLOSING THE PROCESSING OFFICES

All of the address registers and other records were shipped to Jeffersonville in January and February 1982, and furniture, equipment, and property at Laguna Niguel and New Orleans were returned to the Commerce Department or to lessors through the Government Services Administration. Shortly before the processing centers were closed, most of the questionnaires and other confidential materials were destroyed under security conditions and reduced to pulp for recycling. A small percentage of the documents were retained in Jeffersonville for sampling and evaluation purposes (see ch. 9), but because of extensive litigation over the census (see ch. 10), questionnaires from 136 district offices had to be kept in Jeffersonville during the ensuing decade. (That facility stored over 600,000 address registers from the 1970 and 1980 censuses and the cameras, film-processing machinery, and FOSDIC equipment as part of its normal function.) The sample microfilm was stored in the Jeffersonville facility's film library, but the 100-percent microfilm (including the 100-percent pages on the sample questionnaires) was duplicated. As required by statute (Title 44, United States Code), the original set was deposited in the National Archives, where by interagency agreement it would be closed to the public for 72 years (i.e., until 2052). A duplicate set remained in Bureau custody for use in the "age search" operation at its Pittsburg, KS facility. Under the confidentiality provisions of the census law (Title 13, United States Code; see app. 1A in ch. 1), members of the public could apply there for official transcripts of their own census records for the period 1900 to 1980, or for other individuals' records for the same period with appropriate authorizations from the named persons. (The National Archives' record holdings from 1790 to 1910 were open to the public.)

The New Orleans and Laguna Niguel processing offices and the decennial processing operation in Jeffersonville (except for the storage of records there as noted above) were closed officially on February 26, 1982.

HEADQUARTERS PROCESSING OPERATIONS

General Procedures

At Bureau headquarters, the census data received from the processing centers were placed on computer tape, "run" using a series of editing programs that (1) ensured that the data recorded from a questionnaire reflected actual responses and not just stray marks, (2) eliminated inconsistent data, and (3) provided data missing on the questionnaires. The data were further checked for accuracy, completeness, and consistency through professional review, and were eventually tabulated and formatted for publication. (The publication process is described in ch. 8.) Although data began arriving at headquarters in August 1980, tabulation beyond simple counts did not start until January 1981, when all of the 100-percent data were completely captured and accepted. Tabulations for a given State could not begin until all of its data had been processed up to that point.

The computers processed the data for each person and housing unit through statistical editing and (for sample data) weighting routines on the basis of very detailed specification programs. The intent here was to make the published statistics more accurate in their description of the population and its housing, and more useful than if "not reported" categories were added to each tabulation instead. After editing, each sample person and housing unit was assigned a weight to produce estimates of the figures that would have resulted had

all of the Nation's households responded to the sample questions. (See ch. 7.) When these processes were completed, the edited data about all persons and housing units, with their geographic identifications and weights, were stored on computer tape.

Detail-File Preparation

The detail file—a group of individual person and housing-unit data records—was created during the editing operations, and was subsequently used to tabulate the summary tape files (STF's; see ch. 8). The detail file was a final record of the population and housing-unit data merged with the final geographic boundaries. As it was created, geographic files were produced, the data were tabulated and cross-checked against the geography, and editing occurred. (Final maps were drawn, but in an operation separate from processing.) The basic purpose of the detail file was to ensure (1) that all the data had been captured and checked for accuracy, and (2) recognition of all appropriate ED's and the correct block numbers within them. The two basic elements in creating the detail file were (1) transferring census information collected in the field through the FOSDIC operation (see above) and checking the results, and (2) tabulating the figures and editing and weighting the results. When tabulating the detail file, it was discovered that some ED's had not been split or had been split incorrectly. This meant that these ED's had to be split either in the field, the district office, or the processing center. If such situations had not been corrected early enough, they were changed in formulating the final, edited ED files by computer.

Data for the detail file were stored in two phases—100-percent and sample—on a flow basis as they were transmitted from the processing centers. The 100-percent processing took about 4 months to complete, as many geographic boundary reviews and statistical cross-checks ("editals" and "analyzers") were necessary to correct all the data before further tabulations were made.

Creation of the sample-data detail file generally went more smoothly than the 100-percent file, because the geographic problems associated with the latter had been resolved. Sample processing was complicated, however, by the additional editing, allocation, and weighting procedures that had to be completed before the data could be released for tabulation. There were several important weighting factors (see ch. 7); one was sample weight, which was the initial one assigned to all sample data to equate them with 100-percent levels. In the case of the subsampled data from the place-of-work and migration responses, only half of which had been coded for some areas (see p. 24 above), a compensating, supplemental weight had to be assigned.

Edit tallies were compiled from the detail file and reviewed by subject-matter analysts; tabulation tallies were generated after the edit tallies had been cleared. Edit tallies were in a table format designed for internal audit rather than external use; they also were at the State level, whereas tables went to the census-tract level. Only tabulation tables and analyzer programs—both produced at the same time—were used in the review process. Edit tallies were only used to check initial detail-file data. Generally, errors found in the edit tally review were the result of incomplete processing (such as missing ED's), but they also could indicate problems in the edit specifications.

Once the 100-percent detail file was completed, computer processing began for STF's 1 and 2; STF's 3, 4, and 5 followed after the sample detail file had been tabulated. Subsequent production of statistics was not as difficult as getting the "raw" numbers into the processing system correctly, as many computer programs could not be tested and adjusted until large amounts of data had been collected and processed. Problems often did not surface until then.

Computer Edits

Despite the efforts in the field to complete all the questionnaires, there were still some housing units or persons for which certain characteristics could not be determined. In addition to the edits, discussed above, that involved checks to make sure that the information recorded for a questionnaire reflected actual responses and not just stray marks on a page, there was a series of computer edits that accounted for inconsistent or missing data. For example, a householder could not move into a unit in a year before the structure was built or before the householder was born, so the computer changed the year moved in to an appropriate interval. An answer to replace a blank for the same question would be supplied ("allocated") from a preceding unit of similar age and tenure. (See ch. 12 for a discussion of allocation and its application to specific questions.)

Another technique, "substitution," was sometimes used. This occurred when a person or housing unit was known to be present, but no characteristics had been recorded because no interview had been possible or there had been a mechanical failure in the processing system, such as illegible microfilming of a questionnaire page. In such cases, the computer selected data from a previously processed housing unit as a substitute, and it duplicated a full set of 100-percent characteristics for the unit and each occupant.

There were specific tolerances for the number of computer allocations and substitutions permitted for any given geographic area. If the number exceeded the tolerances, this was noted on the diary, and resolved in diary review as described earlier in this chapter. Certain printed reports and most summary tape files (STF's) included tables showing the amount of allocation and substitution for particular items.

Sample Weighting

Following computer editing, the sample data were subjected to a procedure that assigned a weight to each person and housing unit. For areas sampled at a 1-in-2 rate, the sample

weight was close to 2; in areas sampled at a 1-in-6 rate, the weight averaged about 6. Thus, to obtain tabulations for any characteristic for a particular geographic area (e.g., the number of persons in Elm County in a particular income category), the weights for the sample persons and/or housing units with the characteristics of interest were simply summed. Further, the weights were assigned in such a fashion that for most large geographic areas, the 100-percent census counts and the sample tabulations for total population and total housing units were very close. The weights or multipliers, when applied in stages to the sample data for any given area, produced figures that matched or were very close to the complete-count figures for total population, race, sex, age, family size, and certain housing characteristics. (For details, see ch. 7.)

The Statistical Methods Division (SMD) provided the sample weighting procedures that were applied by computer to each area in three successive stages, within which ratio estimation occurred. For persons, the first stage had 17 household-type groups; the second stage, just 2 groups—householders and nonhouseholders; and the third stage, as many as 160 age sex-race-Spanish origin groups. Ratio estimation for housing units followed a similar pattern, except that it was done in two stages for occupied units and in one for vacant units: The first stage for occupied units employed 16 household-type categories and the second, as many as 190 tenure-race-Spanish origin-value/rent groups. For vacant units, there were just three groups.

In addition to the basic long-form sampling scheme, i.e., 1-in-2 for incorporated places with fewer than 2,500 persons (based on precensus estimates) and 1-in-6 elsewhere, there were two subsamples—one in which every other sample questionnaire did not undergo coding for place of work and migration and the other, one of enumeration districts to provide the Early National Sample. Changes were made to these procedures following test runs of data from Delaware, Montana, and Rhode Island.

Analyzers

In addition to the ED-level data checks through diary review, followed by the sample weighting, the data for such areas as States, SMSA's, counties, minor civil divisions, and places were checked through elaborate computer programs called "analyzers." Complete-count data were checked with an analyzer generated from STF 1; the analyzer for sample data came from STF 3. Their purpose was to assure that the statistics for the larger areas conformed to expected levels based on the previous census or intercensal surveys. The analyzers also were used to check population and housing-unit count totals and weights used in sample products.

Confidentiality and Suppression

Census data were refined through many processes, but no figure was released without a final check. All data products—special and general—passed through a variety of analyses to ensure that the statistics had been tabulated properly and that no confidential information would be revealed. To maintain the confidentiality promised to respondents and required by law, the Census Bureau withheld, or "suppressed," tabulations of characteristics of very small groups of people or housing units. In printed and microfiche reports, each suppressed data item was replaced by ellipses (...); on summary tape files, special "flags" denoted suppressed data.

Certain basic counts were not suppressed, even if an area had a count of only one. All other data might be suppressed under certain conditions (see below), primarily where the size of the population being characterized was less than a specified threshold. The suppression criteria differed for population data and housing data, and the thresholds were higher for sample estimation than for complete counts. The application of these thresholds resulted in what is known as "primary suppression." In addition, "complementary suppression" was applied to avoid the possibility of identifying an individual person, household, or housing unit by subtraction. Originally, complementary suppression was to extend to detailed race groups, among Spanish-origin types, between Spanish origin and not Spanish origin, or among the race-by-Spanish-origin/not-Spanish-origin groups. In December 1981, it was decided that in these cases, the suppression would be unnecessary and be a disservice to users. A set of revised rules, which are summarized below, was adopted, and applied to summary tape file (STF) 2 and its products, as well as to all subsequent STF's, tabulations, and products that used 1980 census detail files. However, data extractions or summaries of STF 1 that required suppression continued to use the original rules and/or indicators present in those files. Complementary suppression also was used if the number of units of one type of tenure (owner, renter) failed to meet a required minimum. In such cases, the data for housing characteristics were suppressed for both owner- and renter-occupied units.

The suppression rules were as follows:

1. The following population counts will never be suppressed—total, race counts (detailed groups and totals for American Indian, Eskimo, and Aleut; for Asian and Pacific Islander; and for any other groupings), Spanish origin counts (total and four types and any group of types), Spanish origin by race (or race group) counts, and not of Spanish origin by race (or race group) counts.

2. The following housing counts will never be suppressed—total housing units, seasonal/migratory housing units, total year-round housing units, vacant year-round housing units, and occupied housing units by race and Spanish origin, as described in (1) above.

3. 100-percent population characteristics based on persons for the groups specified in (1) above will be suppressed if there are 1 to 14 persons in the group; sample characteristics will be suppressed if the weighted count is 1 to 29.

4. Population characteristics based on families or households will be suppressed if there are 1 to 4 (sample, 1 to 9) occupied housing units with a householder of the specified race/Spanish origin group.

5. Housing characteristics will be suppressed if there are 1 to 4 (sample, 1 to 9) housing units in the critical universe (e.g., occupied housing units, renter-occupied housing units).

6. There will be complementary suppression between owners and renters and between summary or "major" race groups (i.e., White; Black; American Indian, Eskimo, and Aleut; Asian and Pacific Islander; and Other).

7. There will not be complementary suppression between detailed race groups, Spanish origin types, Spanish/not Spanish total, or race by Spanish/not Spanish groups; nor across geographic areas within a file or between files.

Data Review

To ensure that the edit specification programs (see ch. 12) produced reasonable results, the Bureau's professional staff reviewed the data summaries prepared from the computer tapes. This might require as many as 27 subject-matter specialists working from 2 hours to 3 weeks on a given summary, depending on the number of problems encountered, the time allowed, and the geographic level of detail at which the data were tabulated.

The Population (POP) and Housing (HOUS) Divisions were the principal Bureau units involved in this process; as many as 30 people in their various branches reviewed files and tables. A key staff member in each of the two divisions was responsible for coordinating the materials, answering the reviewers' questions, and deciding on the review time to be allowed. Usually, the reviewers immediately notified the computer programmers about the problems they found and thus tried to determine why the problems occurred. Later, the Decennial Census Division (DCD) received a summarization of all the known and potential problems/errors.

The subject-matter divisions (POP and HOUS) gave the decennial-area programming staff very detailed edit specifications covering how the various census questions should be handled during the editing process. These specifications were supposed to cover all possible combinations of responses. To determine if the edit programs were reasonable, logical, and written correctly, specialists reviewed the detail-tabulation files (generated on the basis of the specifications) at the State level, and the tabulation and report files at every level of geography (such as the county, census tract, and block). These materials were prepared on a flow basis by State. The detail files, unlike the other aggregate data records, contained only the unit records for each individual, and hence a detail file was a unit record instead of a data summary.

The reviewers had to pay special attention to allocation, i.e., supplying information where none was reported. Population edit specifications allowed the computer to go anywhere in the detail file for a given area to find a reported person with similar characteristics to impute in place of missing answers. Housing imputations were based on geographic proximity; where data were incomplete, the computer went back to the previously processed housing unit with reported characteristics, as experience had indicated that adjacent housing units usually were similar. In those rare instances where the first housing-unit record in a file had missing data, an anticipated average was imputed.

The edit-specification programs were based on specialists' judgment of what the data would look like (i.e., how often a particular question would meet with nonresponse and what should be done if it did). The review determined if these judgments were correct or if the edit specifications created a bias.

Specialists checked the data for three test States (Rhode Island, Vermont, and Montana) in greater detail than for the other States, under the assumption that problems associated with programming errors could be identified and corrected for the test States.

The headquarters staff completed its editing and reviews of the individual record files for the 100-percent data in January 1981 and the sample data in June 1982, respectively. It was only after the computer edits, sample weighting, and review were completed that edited information about persons and housing units, together with their associated geography could be stored on the basic record tapes (BRT's) from which all 100-percent and sample tabulations were produced.

When errors were found after the review, errata sheets were issued to accompany the published reports rather than alter the detail files. No attempt was made to generate products from edit tallies or analyzer programs.

TABULATION

Once the above processes were completed, edited data about individuals and housing units, together with associated geographic information, were stored on basic record tapes (BRT's). All 100-percent and sample tabulations were made from these tapes. Although the BRT's did not contain names and addresses, they did have detailed geographic codes and household data that could result in the disclosure of data for individuals; therefore, these tapes were confidential and could be used only by Bureau employees preparing statistical products.

BRT's were developed separately for 100-percent and sample data, and were processed both by type and by State. For review and tabulation purposes, there was a 100-percent edited detail file (EDF) and a sample edited detail file (SEDF) for each State. An EDF (either 100-percent or sample) contained a (tabulation) geographic header, followed by all corresponding

units and their housing characteristics. Each unit had associated with it the resident persons and their characteristics (person packets). An SEDF also contained weights for each sample unit and person. The EDF and SEDF BRT's were reviewed and cleared prior to tabulation.

Data summaries were prepared on computer tapes from the BRT's for all areas, including census blocks, census tracts, places, and counties. The resulting internal summary tapes containing these tabulations were the source for tabulations that appeared in the printed reports, microfiche, and summary tapes made available for public use. The EDF BRT's also were used to prepare public-use microdata samples (PUMS), and both BRT's and summary tapes were used to produce special tabulations at user request and expense. These products and how they were produced are discussed in chapter 8.

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THE 1980 CENSUS TABULATION AND PUBLICATION PROGRAM

INTRODUCTION

The 1980 census tabulation and publication program's first priority was to comply with the Census Bureau's legal mandate (Title 13, U.S. Code, Section 141 (b) and (c)), which called for certain basic data to be delivered by specific times. The Bureau met its two deadlines:

- Within 9 months of Census Day, the President received population counts by State for purposes of reapportioning the seats in the House of Representatives, and
- Within 1 year after Census Day, it gave each State a set of population tabulations, by specified geographic areas, for determining congressional, State, and local legislative boundaries (see p. 29 below). While such tabulations had been provided to individual States on an ad hoc basis in the past, this was the first time Congress (by Public Law 94-171) had required such a product for the entire country.

The 1980 program resembled the one for 1970 in scope, but with far greater emphasis on disseminating data on computer tapes and microfiche. Although the Bureau was unable to prepare all the printed reports it had planned for 1980, it nevertheless tallied and published more data than in any previous census: approximately 1,400 reports, totaling some 300,000 pages (8-1/2"x11"), compared with 2,000 reports and about 200,000 pages (9-1/8"x11-3/8") for 1970. All the planned computer summary tapes for 1980 were produced and distributed, and they represented close to five times the amount of data issued on tape after the 1970 census.

These accomplishments had a price, both in dollars and time. The decennial census had run out of money in 1980 because it counted 5 million more people than had been originally estimated and budgeted. The field offices had to remain open longer than scheduled. A supplemental appropriation took care of some of this problem, but there was a period of about 6 months of funding uncertainty during which vital decennial census work had to be curtailed or, in some instances, even halted entirely. It was impossible to recover the lost time since the funding problem had been compounded by first, a slowdown in the local review program; second, a delay caused by the need to check out the status of every housing unit

Table A. Comparison of Key Operations, 1970 and 1980

(Excludes Puerto Rico and outlying areas)

Item	1970/80												1971/81												1972/82												1973/83												
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F*
District offices closed	x	x	x	x	x	o	o	o	o	o	o																																						
Preliminary report	x	x	x	x	x	x	o	o	o																																								
Advance reports					x	x	x	x	x	x	o	o																																						
P.L. 94-171 program													x	x																																			
Summary tape program					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Final reports									x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

x 1970. o 1980. * and subsequent period.

reported as vacant (see ch. 5); and third, the encumbrance of many lawsuits (see ch. 10). Despite these setbacks, the Bureau did deliver the congressional apportionment counts by the end of December 1980, on schedule. Through an intensive effort that meant diverting talent from other scheduled work, the States received their data for redistricting (P.L. 94-171) by the April 1981 deadline. To accommodate users' needs for sample data for the Nation and large substate areas, selected samples were processed ahead of schedule and the results were printed for distribution beginning in April 1982 in the PHC80-S1 series of "Supplementary Reports."

All of this had its effect on the 1980 tabulation and publication program in terms of delayed processing and modified products; yet, in the end, more data were available for 1980 than for 1970. The increase in the number of census blocks from 1.8 million in 1970 to 2.5 million in 1980, together with more data cross-tabulated by race and Spanish origin, are two examples of the additional statistics.

Printed reports—The Census Bureau originally planned to issue most 1980 reports in several formats—paperbound and hardbound volumes as well as microfiche. In May 1981, the Bureau modified those plans and abandoned the idea of reissuing the paperbound reports in hardbound volumes. Initially, it was decided to offer the PHC series block and tract reports and the detailed data in series PC80-1-D and HC80-2 only on microfiche, reduce the number of other products on fiche except for a few summary tape files (STF's), reduce the number of the series PC80-2 subject reports (see app. 8A), and not produce ZIP-Code data. Adapting to the budget, the publication staff working on the 1980 census was cut back and the release dates for the reports were extended. Subsequently, the Bureau was able to respond to users' requests for tract and other detailed data in paperbound reports rather than on fiche alone. The ZIP-Code data were produced on tape on a cost-reimbursable basis for a consortium of users, who had exclusive rights to the tapes until 1985, when the Bureau was free to sell copies generally. Beginning in 1984, all of the 1980 printed reports, including any internal maps, were made available on microfiche (see below), leaving the census block statistics—374 reports (approximately 39,000 pages)—as the only major series not in paper form. Even here, users could use the fiche to make their own paper copies or purchase them from the Bureau.

Thus, final data for the traditional printed volume 1, "Characteristics of the Population," appeared in the PC80-1 (population) and HC80-1 (housing) series; and population volume 2, "Subject Reports," was issued in the PC80-2 series. Housing volume 2 was HC80-2, "Metropolitan Housing Characteristics," and housing volumes 3, 4, and 5 were represented in three series: Subject Reports (HC80-3), Components of Inventory Change (HC80-4), and Residential Finance (HC80-5), respectively. While a complete set of PC80-2 subject reports had been planned, for budgetary reasons (as noted above), some were canceled and the publication of others, such as a few of the race reports, was delayed until later in the decade when other Federal data users helped fund the tabulation and publication costs.

Microfiche—While the Bureau made limited amounts of data—principally summary-tape displays—available on microfilm after both the 1960 and 1970 censuses, it then discontinued the use of microfilm as a product medium and for 1980 offered microfiche instead. Microfiche had several advantages: The 4" x 6" sheets of film contained up to 98 pages of printed material and could be easily and compactly stored, and the reading equipment was reasonable in cost and widely available. Thus, fiche was a fairly inexpensive way to provide a great deal of data. Commercial firms were selling census publications dating back to 1790 on fiche, and fiche for reports from 1968 forward became available either through the Census Bureau or the Government Printing Office. For the 1980 census, virtually all of the reports issued on paper also appeared on fiche. In addition, some of the data appearing on computer tape, notably from STF's 1A and 3A, the Equal Employment Opportunity (EEO) file, and the Public Law 94-171 population counts file (needed in legislative redistricting), were repeated on fiche. Because of this broad overlap, no attempt has been made in this chapter to describe the fiche products as a separate category. Printed report series on paper or fiche—are described in the section beginning on page 8–40.

Public-use tapes—Public-use tapes for 1970 consisted of about 2,000 master reels at 556 or 800 characters (bytes) per inch, or "bpi." For 1980, the output was about 1,100 reels, but technology now allowed "packing" of up to 12 times as many data on 1 inch of tape as was possible in 1970. Most of the reels of 1980 were 6,250 bpi, with maximum capacity of 160 megabytes (160 million bytes) each. Allowing for less-than-capacity reels, the 1,100 reels of tape represented 160 gigabytes (160 billion bytes) of data.

The 1980 census tabulation and publication system (i.e., the combination of equipment and procedures needed to do the work) was designed during the late 1970's on the basis of anticipated requirements, and was refined to accommodate budget and computer-processing constraints. The system as a whole comprised three subsystems—tabulation, photocomposition, and publication; these are described in the following sections. The three subsystems were interdependent in the sense that they had the same end purpose—published data products. Thus, the tabulation subsystem was shaped to fit the table outlines. The outlines were designed to meet user needs on the one hand, and the ability to tally the data for the tables, on the other. Photocomposition parameters influenced the choice and arrangement of tables; those parameters affected data-product decisions that led to the tabulation plans in the first place.

In general, the tabulation and publication requirements resembled those for 1970. The systems had to take into account changes in the characteristics of the UNIVAC computer system since 1970, such as in the tape-drive standards, mass storage and core, system stability, the charging algorithm, and the availability of terminals, as well as increases in mainframe power. There were changes in the tabulation and publication program for 1980 over 1970: The three 1970 counts (i.e., computer "runs" of the census basic record tape that summarized the statistics to be published) for 100-percent data were combined into two for 1980; a new report series was added for governmental units; and there were data products for redistricting and neighborhoods. There also were significant alterations in the precensus process after the dress rehearsals, changes in the budget (as already noted) and staff, and, during the census processing itself, unanticipated rerunning of detail files.

TABULATION SYSTEM

After evaluation of possible alternatives for 1980, it was decided to modify and use the generalized tabulation system (GTS) already in place at the Census Bureau for nonprogrammers who needed to tally and summarize data and produce printed tables. The GTS fell short of the 1980 census's complex geographic and tabular requirements, hence its use generally was confined to its dictionary and tallying capabilities.

The GTS dictionary was created independently from the tally for which it was required. The dictionary described the base data to be tallied; that is, each item was given a name, and entries stated the record type and location of the item, its language, and range of permissible codes. The dictionary also carried blocks of coding that could be added to tally programs to create recodes from one or more data items. (A recode was a reclassification or recombination of the various questionnaire categories represented in one or more data items; for example, poverty status was determined through the responses to the questions on household relationship, number of persons in the household, and household income.) There was one permanent, updatable GTS dictionary for each of the edited detail files tallied in the census.

Tally specifications were developed to provide all of the counts or estimates required by the table outlines for a particular report. Additional data tallies were specified to facilitate data check-out, provide unpublished data for public-use tapes, or produce base data to be used in suppression procedures (i.e., those used to prevent identification of individual persons or housing units in the published tables). Where a necessary distribution or recode did not appear in the dictionary, it was prepared and added.

The summary levels to be produced were determined according to table and user requirements and the minimum tally level (the "least common denominator," or LCD) was identified. The LCD allowed the later generation of all higher summary levels. The universe for each matrix was examined and notes were made of each different universe and of which matrices had the same universe. A plan was devised to show the flow of the input data through the program. Generally, the matrices with the least restrictive universes were tallied first; within those categories, housing tallies preceded population tallies. A list of the names of recodes required for each matrix was compiled and arranged in the order in which the recodes would be needed during processing, together with the names of any necessary supporting recodes and procedures. The list then was reviewed to eliminate any duplicate recodes.

Programming

The Decennial Census Division (DCD) staff wrote GTS statements and commands for the GTS tally generator to use in creating source coding and in compiling a GTS COBOL[1] tally program. In the process, specified blocks of coding from the GTS dictionary were incorporated into the tally program. If the generator or compiler detected inconsistencies or "illegal" operations, corrections were made and the process was repeated. The resulting program directed the computer to produce tally summaries at the lowest level, from which all higher-level summaries would be accumulated. Summarization was done outside the GTS, usually with two or three custom-coded programs that directed production of the summaries, sequencing of the files, addition of area names from the MRF (master reference file) name files, and assignment of keys from which data suppression was performed with subsequent programs. Some generalized subroutines for packing, unpacking, data suppression keys, and so forth were incorporated to provide consistency and efficiency.

Testing and Verification

The Bureau divisions involved in the census selected three "test" States—Montana, Rhode Island, and Vermont. The tabulations usually were verified by running the data for these three States through test and production-test modes on the computer. In the first phases of testing, test decks and/or a small portion of a detail file were used as input. Output was prepared for review by using several types of data displays and/or dimension summary displays (DSUM's); the types were as follows:

1. **Full displays** produced a complete display for every matrix for every area for all summary level(s), including geographic codes names, and data-suppression keys. In practice, full displays were produced only for all areas of the three "test" States, and then only for STF's (summary [computer] tape files) 1 to 3. (Because of their size, STF's 4 and 5 were reviewed with products other than full displays.)

[1]Common Business-Oriented Language, a high-level programming language.

Displays for other reports or States were more selective. Areas were chosen by means of parameters to solve specific problems (see 3. below).

2. **First-occurrence displays** produced for each summary level a complete display for the first area to occur.
3. **Selected data displays** produced full displays or particular matrices for selected areas.
4. **DSUM's** showed for all areas and summary levels the complete geography, a universe total, and values for each category of each stratifier in each matrix as if the stratifier were the only dimension for the matrix. Again, DSUM's for all areas, levels, and matrices were generated only for the three test States' sample data. Elsewhere, DSUM's were parameter driven and restricted to specific areas and levels, and occasionally to certain matrices.
5. **Abbreviated DSUM's** produced complete geography, including suppression keys, and universe totals for every matrix in every area and summary level, unless parameter cards limited them to designated areas and/or levels.
6. **First-occurrence DSUM's** were produced as in 2. above.
7. **Selected DSUM's** were produced as in 3. above.

The STF data first were checked internally to see that like universes and their stratifiers came up to the same numbers. This was followed by verification from external sources such as independent tallies and various publications. As the number of cleared tabulations and publications increased, so did the number of sources for check data. Subject-matter specialists were given displays so they could review the results after the internal checking had been performed. The usual procedure was to run the STF data for the State of Montana until they had been cleared by the subject-matter divisions, and then to run the data for Rhode Island and Vermont in a production mode. After that, it was assumed that the STF programs would work with the remaining States without further review.

Deferred GTS Tally

When processing reached STF (summary tape file) 5 and most of the subject reports, the number of tally cells per summary grew so large that DCD developed what was called a deferred GTS tally procedure. This was designed to handle very large tallies while still retaining the GTS dictionary content and capability. To record a tally, the relative position of a designated tally cell within a summary was computed, and the increment was combined with the weight to be tallied. This formed a construction called an IW (increment/weight). The IW's were packed into arrays and written out as the arrays were filled up or the geography changed. A parameter record was formatted and placed at the front of the output IW file to define the characteristics of each matrix.

The generated GTS tally program had to be recompiled with additional COBOL codes to control activities not provided by the GTS tally generator and that could not be added until after the tally had been generated.

Planning for deferred GTS tallies was similar to that for the regular GTS tallies, except that the second phase of the deferred process required a separate program to unpack the IW sets and accumulate values into the appropriate cells. The expansion and accumulation of summary data was controlled by the parameter record and required virtually no programmer activity.

Two generalized summary outputs were produced—one for States, and the other for divisions, regions, and the Nation. The same procedure as for regular GTS tabulations was followed to verify very large tabulations, except that their size precluded the use of full data displays.

Other

In a limited number of instances, tallies were written outside the GTS, but in such a way as to blend in with later software and other existing procedures.

Some tallies required input of control files to add specialized geographic codes; other tallies "wrote" specialized files. Programs were developed to tally complete universes for ease of checking, and then revised to tally a "screened" file or universe subset prior to production processing; this reduced computer costs for the latter.

A common variant of the summary process was to introduce an equivalency file that equated census geography to special areas such as neighborhoods, school districts, and the like. The equivalency file usually matched STF 1 and/or STF 3 LCD files in assigning special codes used later in the summarizing process.

PHOTOCOMPOSITION SYSTEM

During the 1970's, several Census Bureau divisions were involved in identifying and evaluating available computer composition systems and recommending selection of one for 1980. It was decided, however, to adapt the Linotron system used for the 1970 census to the VideoCOMp phototypesetting equipment system used for the subsequent 1977 Economic Censuses, but with a number of major improvements and objectives for 1980 over 1970, such as:

- Eliminating the hundreds of thousands of input cards that made up the 1970 table components
- Improving retrievability of table components between and within reports
- Reducing the number of corrections required during page-image creation
- Automating many aspects of the page or table composition, specifically reducing markup and coding requirements

- Introducing greater consistency and standardization in terminology, reports, etc.
- Improving timeliness of publication
- Streamlining checkout and review processes

In general, these objectives were met and almost without exception, page images were available before they were needed.

The 1980 photocomposition system comprised a set of programs and procedures, described below, designed for use on the Bureau's ENTREX and UNIVAC computer systems, that allowed creation of computer tapes capable of being processed either on the Bureau's computer-output-to-microfiche device (COMp80/2) or the Government Printing Office's VideoCOMp equipment to produce statistical tables. The COMp80/2 output was on photosensitive paper or microfiche for proofreading; the VideoCOMp provided output on photographic film or photosensitive paper for printing.

Table Outline Operations

Table outlines are the minimal representation of a statistical table with all the table components defined, including titles, headnotes, boxheads, area designators, stub sideheads/data lines, and footnotes. The table outlines also included estimates of the numbers of data lines and columns, data-field size requirements, and the number of output pages. The subject-matter divisions (Population and Housing) transmitted the table outlines to the Decennial Census Division (DCD) in various forms, including typed originals, marked-up drafts, and pasted-up versions of previous reports. DCD reviewed the terminology on each report or STF outline for content and internal consistency, as well as consistency with tally specifications and table components in previous reports and summary tape files (STF's). During the review process, the tables were reduced to their lowest-common-denominator (LCD) components, which were identified as existing in the 1980 glossary, the 1970 glossary, or neither. The outlines were also reviewed with an eye toward potential problems in tallying or manipulating the data. After circulating the outlines for comments and resolving differences with the subject-matter staffs, DCD released the final version for use.

Within a report, a subset of the tables designated as "unique stubs and boxheads" underwent **markup**—the process of formatting the table components on pages in a manner that conformed to publication standards. Markup was applied only to the "worst cases"—those versions of the tables with the widest possible stub for each boxhead or the deepest boxhead for a stub. This ensured consistency of presentation among the tables in a given report or series. Generally, the markup specifications included the following:

- Orientation of tables—upright or broadmeasure
- Horizontal allocation of space for the stub and columns, including the data-field size
- Vertical allocation of space for the boxhead and stub, including runover and blank lines
- Format of the data—integer, one decimal place, etc.
- Page breaks for multipage tables
- Stub sidehead level, bold data-line designations, and data-line indentations
- Other items where needed, such as the format, position, and sequence of data-driven variables (such as "A" fields) developed by the table-preparation programmers

Updating the Glossary

Both the 1970 and 1980 censuses had glossaries that contained the terminology used in the statistical tables developed from the table outlines, such as blocks for titles, headnotes, boxheads, sideheads/area designators, stub data lines, and footnotes. Some of the glossary items also included composition controls, such as for casing, hyphenation, and indentation.

The 1980 glossary consisted of random-access files of individual glossary blocks referenced through the use of existing systems software. Updating required three UNIVAC computer runs, two UNIVAC-ENTREX transmissions to select and move the source blocks maintained on the UNIVAC files to the ENTREX system for display, and then an ENTREX program to key corrections. The corrected file then was moved back to the UNIVAC equipment for review and insertion of any new blocks into the 1980 glossary. Blocks could be moved from the 1970 glossary to the 1980 glossary by using another UNIVAC process, without going through the ENTREX step.

During the process of finalizing the table outlines, the DCD staff first identified all the components in terms of which blocks existed in the 1980 or 1970 glossaries and which did not, and created the ones that did not exist from similar blocks in the glossary. The source blocks then were transmitted from the mainframe computer memory to the ENTREX equipment, where a listing of the designated source blocks was printed. This listing was then annotated to reflect changes, which then were keyed. The updated listings then were transmitted to the mainframe computer memory, displayed on screens, and reviewed.

The DCD staff moved designated blocks with their appropriate identifiers into the 1980 glossary. Each block was identified with a reference name, such as MS for marital status; each variant of MS had a different version number—MS(1,2,...n). Within each section, title, headnote, etc., the displayed glossary blocks were arranged in sequence for ready referencing. Most blocks were in alphabetical-reference-name/length-of-block sequence; for example, nine-line "age" blocks followed the eight-line "age" blocks. Some sections had blocks arranged in their sequence of entry in the glossary. DCD displayed and issued the glossary updates on looseleaf pages with one block

per page, and about once a month it displayed the complete 1980 glossary with multiple blocks per page. A block-deletion technique was used to remove errors.

Developing and Expanding the Page-Image File

Once the glossary had all the table component blocks needed for a report, the next step based on the markup was to code, create, and display page images that contained unique stubs and boxheads. This process involved retrieving blocks from the glossary that represented specified tables or parts of them and coding their "aesthetics," such as spacing and typefaces. Limiting the displayed images to the unique ones reduced the amount of review and correction or adjustment. After reviewing these, the DCD staff began developing the complete page-image base file by retrieving all or part of the unique stub and boxhead file and/or using other glossary components. By using the "worst case" approach, it was not necessary to mark up the base file itself.

Expansion of the base file involved picking up the standard portion and/or adding the variable portion (such as geographic names or identification codes) of the data required for each publication area in a given report series. Each table that needed the addition of one or more namelists underwent additional markup. Some actions were required only once for a report series: For stub expansions, this involved designating the namelist to be used, specifying the available area in the stub, and indicating any applicable sidehead spacing. For boxheads, it meant defining the depths of the boxhead levels and specifying the namelist(s) to use. For each area in a report series, the staff determined how much of the variable data would fit on a page, taking into consideration data-field size, name-length requirements, reader breaks, sidehead spacing, and page-continuation needs. These markup specifications were coded to expand the tables. Not all of the reports were handled in this manner; some had data-driven expansion operations specified in the table-preparation program. For some reports, the unique stub and boxhead file equaled the base file, or the base file equaled the expanded file.

Retrieval and compiler programs were used in a computer run. **Retrieval programs** were used to produce page images in the form needed by the photocomposition compiler, and the compiler output became input to the photocomposition display and merge operations. Input to the retrieval program was a set of coded commands leading to the creation of a page-image file. Among the retrieval commands were such functions as obtaining the glossary blocks or lines, supplying pagination information, crossing glossary stub blocks, composing folio lines, retrieving previously used commands in whole or part, inserting vertical spacing, indenting stub lines, adding footnote symbols, and so on. The retrieval program worked at the table level, but was used to produce page units. Each table normally was processed as an entity, whether it was a one-page or a multipage table. For the latter, parameters were used to paginate the table by stub lines, boxhead columns, or both. Each set of input commands—retrieval and nonretrieval—used to create a table was also stored in a retrieval element and could be reused by means of a retrieval system command.

Using the **compiler program** while producing compiled page images, the computer issued error, warning, and informational messages. The program allowed the computer to read the uncompiled page-image elements and create compiled page elements, one page at a time; to list all these pages with their terminology, controls, and messages; and to check such things as the page-size limits and the presence of necessary table components in the correct sequence. If the computer determined that the compiled page-image would not be correct, it printed out an error message and did not compile the page. A clerk reviewed this message, resolved the problem, and reprocessed the page. After each run, the computer produced a summary showing the compilation status of the pages processed. This retrieval and compiling system created unique stub and boxhead files, base files, and expanded files.

Creating Photocomposition-Device Output

The Bureau's system used two types of programs, described below, for presenting photocomposition output; these programs allowed the computer to convert the files to a format suitable for processing on the COMp80 and/or VideoCOMp systems.

Data page-image program—This program contained the commands for merging the compiled page-image elements with the statistical data from a table-preparation data file. The compiled images usually determined where on the page and in what format the data would be shown. The computer used a table-identification number associated with specific table-preparation data to select the proper page images, or it could selectively merge tables that fell within prescribed parameters. There were two options—"G" (generator) and "M" (mix)—available for the merge: Under the "G" option, data could be directed to specified page images and did not have to fill the pages of the table exactly; there could be less than a page of data. The same page image also could be filled several times with data, each image and data-merger being written out in turn. The "M" option directed that the data would have to fit the targeted table exactly as specified for all pages in the table. Here, data filled each page image in turn and the images could not be reused.

Page-image display program—This program allowed the computer to display compiled page images for unique stubs and boxheads and for base and/or expanded files without data. The pages were presented as they would appear, except that format codes were shown in the data fields. The reviewer could select specific tables and pages.

Namelist Operation

A namelist was an inventory of geographic terms organized by State, standard metropolitan statistical area (SMSA), and the like, often with appendages such as county, city, or town,

that provided the terminology for a table or part of a table. Sometimes a namelist had spanners or sideheads present and could have glossary-block subcategories such as "male" and "female." The namelist was structured in the same fashion as a glossary block, using a number of routines developed for glossary processing. Namelist blocks were created on the computer from existing files, without keying; a few namelists were created by the glossary-block method (see p. 8–9).

Creating the namelist was a generalized, partially parameter-driven, two-step process based on specifications that defined the namelist's makeup. In step 1, names were gathered from various reference files (MRF's) or other files such as place-of-work lists. In step 2, the step-1 output (and crossover pieces, if any) was compared with the namelist specifications to see if each area qualified for inclusion. For some lists, glossary blocks were replicated as part of the namelist. For most namelist processing, a file with geographic codes was produced for comparison against the table-preparation output. The namelists were also checked by clerks, who reviewed computer displays and printouts for test areas.

Enhancements

To make the photocomposition software easier to use, the DCD developed a number of system enhancements:

Pre-merge routine—This alleviated the need for both the programmer and the photocomposition staff to understand and interpret the page requirements for a double-pagination table. The routine allowed the table-preparation data to be segmented by applying the page cuts as dictated on the page-image file.

Characteristics display—This abbreviated display of the base page-image file provided information such as remaining space available in the stub, the position and depth of horizontal spacing, etc., for the expansion-markup process.

Glossary history display—This display showed the usages (that is, the specific table) of each 1980 glossary block. It was used only for deletion purposes.

Special symbol file—This file contained predefined symbols, such as for "jam" values for the upper and lower limits of medians, "not applicable" (three dots), and so forth. The table-preparation programmers and the photocomposition staff used this file to insert overrides in the tables.

PIF (page-image file) protection—To prevent accidental changes to cleared PIF's, a PIF protection procedure allowed the file to be read but not altered.

Pagination capabilities—These routines simplified the pagination processes. Parameters provided by the photocomposition staff allowed the creation of tables with two or more pages in both the stub and boxhead or paneled pages (i.e., tables not wide enough to spread across the page but narrow enough to have two or more on a page).

Boxhead pagination—Based on the number of columns per page, the boxhead terminology was formatted on a page with the appropriate continuations for the higher level boxhead categories (spanners). This accommodated boxheads, such as those for industry and occupation, that spanned many pages.

Computer composed folio elements—Folio lines were created by retrieving the report and area names and page-number prefixes from established folio elements for the report series.

Base/expansion comparison—A computer match between the base and expansion files ensured that any non-namelist components were consistent. A similar feature verified that the expanded table had a terminal rule (a horizontal line at the end of the table).

Glossary updating—This process paralleled but bypassed the ENTREX operations, allowing a clerk, using a demand terminal, to update the glossary directly on the mainframe computer.

PREPARING DATA PRODUCTS BY COMPUTER

Published Reports

Generally, the first reports from the census show few characteristics for many geographic areas, while the later reports contain detailed data on many characteristics for a smaller number of geographic areas. This shift in emphasis required corresponding shifts in programming and other activities. The preparation process for a printed report used table outlines and STF specifications, and required the creation of further specifications; the development of the necessary software; a review procedure to allow checkout of the specifications, programs, process, and data; and a production processing system. Depending on the report, the number of specifications varied, and were prepared either in the DCD or in the subject-matter divisions. In either case, the participating divisions reviewed and corrected the initial drafts; the resulting specifications normally were updated further as the software-development and data-review processes continued.

Specifications were required for the following:

Data manipulation—These specifications indicated the source of the data from the STF's, the manipulations required, and their output format and sequence. The manipulation usually involved rearranging data, performing arithmetic operations, and developing derived measures from one or more matrices. Each data cell in the table had to be defined—some as special cases to be "jammed" appropriately.

Data suppression—Generalized disclosure-avoidance rules were used to develop exact specifications for suppression of each data cell or groups of cells in a table to prevent identification of individual persons or housing units in the published reports by subtraction or other arithmetic means.

Historical data—For reports that required historical data, specifications had to be developed to tally, summarize, and manipulate them for the tables. In some instances a tally was not required, but specifications were needed to key, edit, update geographic codes, and otherwise process data from publications or other sources or to extract them from existing summary tapes, and to summarize them appropriately. Given a variety of input sources consolidating the data from them required a series of programs and operations.

Name files—Geographic area names or codes were introduced most often through the page-image files that the photocomposition system produced. In some cases, name or code selection was based on criteria that did not allow them to be prepared along with the page images; here, the table-preparation programs were used to set the names or codes into the page images. When the names or codes were introduced through the photocomposition system, specifications had to be written for matching and verifying the independently derived areas to those selected through table preparation. Such things as typeface, type size, indentation, continuation rules, and the like, had to be specified in all cases.

Control files, lists, and criteria—Selection specifications were written for tables that showed data selectively, such as tracts with 400 or more Black persons. The selection criteria varied in complexity.

Other files—Specifications were prepared for data files, such as footnotes or land area, that had to be introduced.

Page composition—Some reports, such as PC80-2-6E, table 3, and PC80-1-A, table 4, required that nearly all the data (geographical or statistical) on a page be set or controlled by the table-preparation process. These had to have very detailed specifications covering which areas went on a page, sideheads, data lines, indentations, overrun lines, reader breaks, end-of-page rules, widow lines, and so forth.

Derived measures—Specifications explained the method of computation and spelled out such things as rounding, step sequence, decimal points, treatment of upper and lower intervals, midpoints, jam values, etc. Based on specifications such as those listed above, and as many as were applicable to a particular report, programs were written to prepare computer output for merging with the page-image files. This output consisted of records with identification fields, data fields, alphanumeric strings, or special control fields, which normally had to be consolidated and put in sequence prior to merging. A number of standardized routines were used for such tasks as unpacking records that had zero data packed out, name formatting, matrix summarization, mean and median computation, etc.

The publication system was checked internally within the DCD. As the various steps were felt to be correct, test data were delivered to the subject-matter divisions' analysts for review. Since the various reports required different inputs and steps, the checkout products differed somewhat; this normally was agreed to in advance and a formal structure of transmittal and clearance was followed. Each distinct process was represented by its own set of test data; for example, if historical data were prepared by means of a special process, those would be checked out independently as well as part of the table-extraction process. Name files, control files or lists, and the like were similarly treated. The table-extraction and data-suppression processes were always checked; table extractions usually were verified with consecutively numbered test decks and then live data for one or two of the "test" States. For the reports published at levels higher than a State, the State data were made to represent the higher levels. Suppression was checked by preparing test decks that forced all the rules to be activated. The staff also reviewed "internal" files with "external" files to make certain that the suppression routines were working correctly. Table data were reviewed as HSP (high-speed printer) displays without stubs and boxheads, or as fully formatted table output from the COMp80 or VideoCOMp on microfiche, paper, or photographic negatives that could be "blown back" and photocopied. Standardized software allowed the computer to display tables, generate test decks, and, late in the process, accept standardized specifications keyed as input to a program that duplicated table-extraction steps and compared the results with the output from the table-preparation process. Various "compare" programs also were used to detect changes from one test to another.

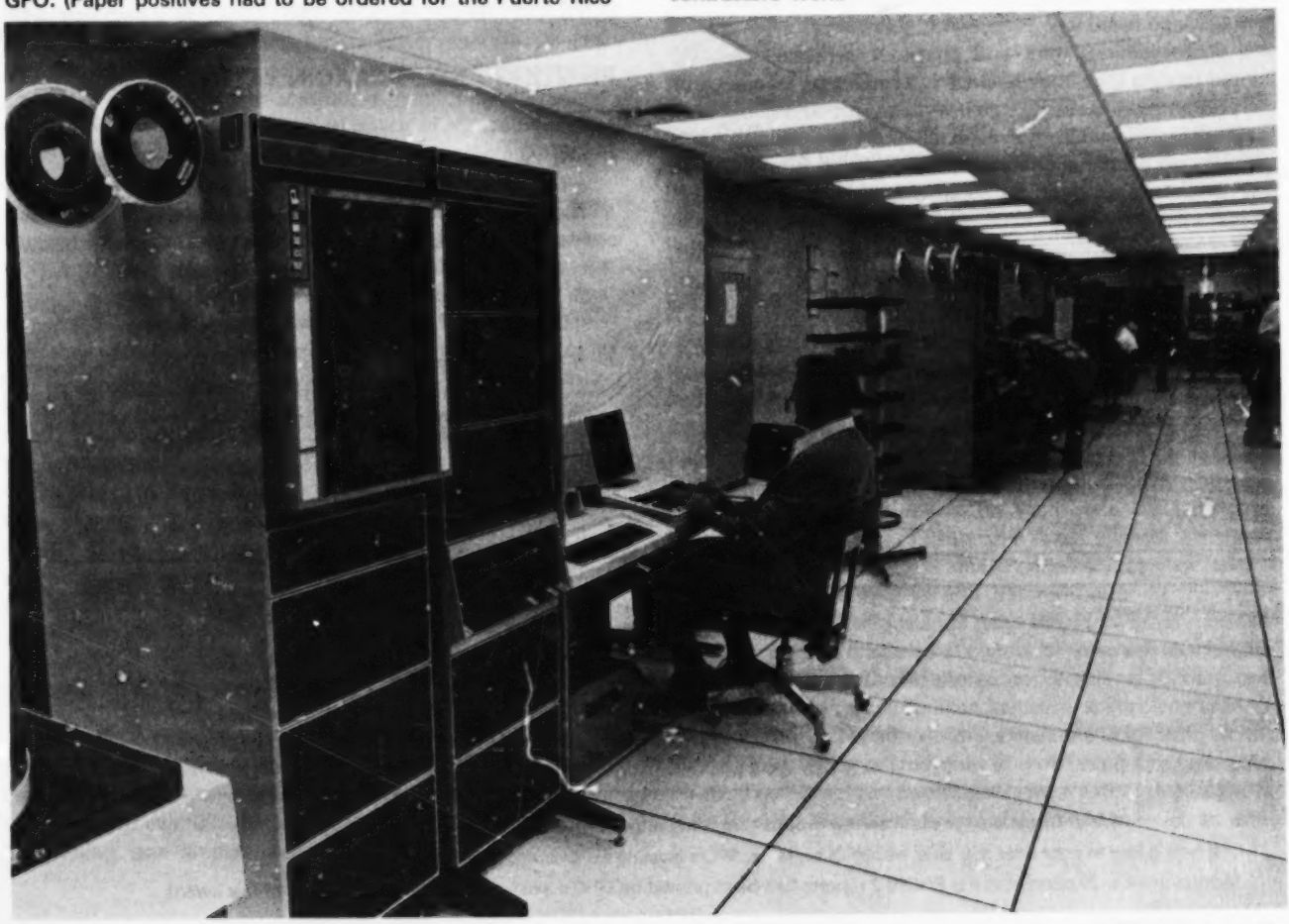
Preparation of statistical tables—The Decennial Census Division (DCD) sent data tapes to the Printing Branch in the Publications Services Division (PSD) for transmittal to the Government Printing Office (GPO) for processing on the VideoCOMp 500 phototypesetter. Its output was a film negative of each page, ready for printing. The GPO returned the negatives and tapes to the Printing Branch, which stored the data tapes and sent the negatives to the control section of the Publications Planning and Graphics Branch. Here, a Dylux proof print was made from each negative; these prints then were photocopied on paper and the copies were distributed to the subject-matter divisions for review. After the tables had been checked for accuracy, corrections and revisions were consolidated onto master proof copies that were returned to PSD. Corrections and revisions were made either by cutting and stripping the negatives in PSD or by having DCD correct the data tape and rerunning it through the VideoCOMp system. After the subject-matter divisions had approved the corrected tables, the negatives were assembled with the appropriate text and other components in camera-copy form. The subject-matter divisions reviewed and cleared this package and sent it to the Printing Branch for release to the printer.

The VideoCOMp 500 phototypesetter—The GPO owned and operated this computer-controlled device. Formatted magnetic tape provided the input, and the output could be selected either as a positive print (photographic paper) or a negative (photographic film). In practice, one machine generally was loaded with film and the others with paper. Typeface families (fonts) were stored in the VideoCOMp 500 in digital form. A "frame" on the magnetic tape contained all the characters and control information for a page of output. Responding to the data on the input magnetic tape, the machine electronically selected the specified typeface, type size, and location of each character.

All the characters and rules for a page were displayed briefly on a high-resolution cathode-ray tube (CRT) screen. A roll of the photographic output material (either paper or film) was transported across the face of the CRT and stopped for exposure of each page. The cartridge containing the exposed material then was removed, placed in a separate processing unit, and developed. Pages were cut from the roll by an automatic slicer.

Use of Photographic negatives—For most of the 1980 census tables, photographic negatives were ordered from GPO. (Paper positives had to be ordered for the Puerto Rico publications, though, because the diacritical marks used in Spanish were not available in the table-formatting software.)

Negatives, rather than paper output, of the tabular material were ordered to assure the highest possible printing quality. Had paper positives been used for printing, second-generation negatives and third-generation printing plates would have been required. These extra generations would have caused some loss of quality; more importantly, it would have created a dependence on the printing contractor to make good-quality negatives, which could have affected the printing quality of the census publications. Given the 6-point type used in the detailed tables, imprecise negatives would have produced illegible tables that would not have been detected until after the reports had been printed. There also was a tradeoff in costs: GPO charged $1.38 per page for paper positives; the commercial printer would have charged $1.00 to $1.45 per page to make negatives from these, resulting in a final cost of $2.38 to $2.83, opposed to GPO's flat charge of $2.59 per page for VideoCOMp negatives. The GPO's negatives were consistently of top quality, but even so, there were problems with some of the printing contractors' work.



User Tapes

The process for user tapes was much the same as for printed reports. Some of the basic differences and similarities were as follows:

Standard conventions (essentially derived from comments on the 1970 tape products) were followed in preparing all tapes. This also was done for tables, but within the photocomposition system. Some of the tape conventions dealt with header and trailer labels, language, record and blocking sizes, fixed positions for geographic codes, name and suppression flags, fixed field sizes, tape density, and so forth.

Specifications were limited to those for data manipulation and suppression (often to avoid total suppression of a characteristic), and derived measures. Names appeared in the file, but were introduced in the summary process. Suppression keys were set in the summary process; physical suppression took place as the tapes were produced. Neither historical data nor footnotes, nor land area, etc., were carried. Control files were not needed, because all tabulated areas usually were prepared for tape. Depending on the file structure, additional specifications were needed to eliminate some zero data or completely suppressed records. Specifications also documented and described the user tape itself.

Program development and checkout paralleled that for printed reports (see above). Once in production, clearance of the printed reports was a signal to begin producing the user tapes. There was no formal clearance process for the tapes; a table review from the printed report produced from the tape was considered adequate for States other than the three "test" States.

Microfiche

The process for microfiche was much the same as for the printed reports and user tapes, with the following differences and similarities:

Standard conventions were followed, except that some specifications had to be added for eye-readable headers, other identification data, indexes, frames per fiche, character size, fiche style, etc. The number of specifications required were the same as for user tapes, but with the addition of footnote requirements and specifications for eliminating data for certain areas and for describing the microfiche. Program development and checkout paralleled that for user tapes and printed tables, except that the microfiche (or blowbacks of them) and the required supporting data were reviewed together. Once in production, clearance of the printed reports also signaled microfiche production without further clearance. The National Technical Information Service (another Department of Commerce agency), which produced the fiche, carried out a quality-control program that monitored both production and duplication, and the Department of Commerce's Office of Publications staff visually reviewed the first and last fiche produced from a given summary tape once the fiche production had reached acceptable quality. DCD conducted a readability check of "hard" copies (blowbacks) of random fiche frames.

While there was similarity in the specifications required for the three basic output media, at least in number, there actually were three sets of common specifications. For example, a single suppression specification did not work for printed tables, tape, and microfiche, although the data they contained were suppressed identically in concept.

PRINTING AND PACKAGING CONTRACTS

Printing

The following contracts were established through the Government Printing Office (GPO) for the printed reports below:

Map Printing and Packaging[2]

The PHC80-1, *Block Statistics* map series (the reports were issued only on microfiche) had four different sizes of paper maps: 17"x22", 22"x34", 34"x48", and 42"x60". These were

[2]For discussion of maps, see p. 22 ff.

Contract number	Period	Report series
A474-S (single-award)	8-1-80 to 7-31-81[1]	Preliminary and advance
C546-M (multiple-award)	11-1-81 to 12-31-81, reissued for 11-1-82 to 12-31-82 and 1-1-83 to 12-31-83[2]	Final (HC80-1-A, B; PC80-1-A, B, C, S; PHC80-3, 4, S2)
B126-M (multiple-award)	7-1-83 to 6-30-84[3]	PHC80-2
A195-S (single-award)	8-1-83 to 7-31-84	PC80-1-D

[1]The Department of Commerce printed the few reports remaining after this time.

[2]Reports going to print after this date were published on GPO's existing contract C-265M.

[3]Approximately 20 percent of the PHC80-2 reports had been printed on GPO's existing contract A814-M prior to this award.

printed on one side only; all were folded to 8 1/2"x11" and inserted in a gusseted envelope. A contract (B515-M) on a multiple-award basis was established through the GPO for the period from November 1, 1981 through October 31, 1982 for printing the maps. A multiple-award contract (B514-M) was used to procure the envelopes, which were supplied to the contractor (contract B515-M) on a flow basis.

The PHC80-2, *Census Tracts,* series had five different sizes of paper maps: 11"x17", 17"x22", 22"x34", 34"x44", and 36"x48". All maps were printed on one side only, folded to 8 1/2"x11", and inserted into 9 1/2"x12 1/2" kraft envelopes. A single-award contract (B183-S) covered the period August 1, 1982 through July 31, 1983.

(The PHC80-1 and PHC80-2 maps were sold separately from their reports.)

Census Bureau personnel conducted periodic press inspections throughout the entire printing period. In the few instances where poor quality printing was detected, press inspections were intensified until standards were met.

Printing Costs and Pricing

The GPO determined the sales price for each printed report, fiche, and map that it sold, based on its production cost for a particular item. While the price for any given report was based primarily on the number of pages, the size of the press run, the amount paid on a particular contract at a particular time based on bid, and changes in GPO pricing policy all affected the final price. Thus, two reports of identical size in the same publication series might not carry the same price.

The Census Bureau paid the printing costs for all "official" copies, including those sent to census depository libraries. GPO "rode" the printing contract, i.e., it paid for printing and binding whatever number of copies it decided to sell, plus copies it furnished to Government depository libraries. If the GPO sold all its "sales" copies of a given report or map, it could elect to reprint the publication or declare the item out of stock. In the latter case, the Census Bureau might fill a customer's order from its own stock of "official" copies, but the money had to go to the Superintendent of Documents. In some cases, the GPO decided to discontinue sale of a given report or map and either discarded the remaining copies or offered them to the Census Bureau to sell, as above. Where the Census Bureau published a printed item that it was agreed GPO would not sell (but would contract for the printing), sales proceeds also were to go to the Superintendent of Documents.

SERIES DESCRIPTIONS

The 1980 census report series were organized into three major groups according to subject matter. The population census reports (PC) displayed results from population questions (for example, data on age, sex, race, Spanish origin, commuting, and employment). The housing census reports (HC) focused on housing subjects (e.g., rent, value, fuels, facilities, and number of rooms). The PHC reports combined the results for both population and housing. Table B shows the topics covered in the 1980 census in the 50 States and the District of Columbia; for an item-by-item discussion, see chapter 12. Not all of these topics were covered in Puerto Rico andthe outlying areas; for details, see chapter 11. Within most series, the reports were organized geographically, with one for the United States, each State, the District of Columbia, Puerto Rico, Guam, the Virgin Islands of the United States, American Samoa, the Northern Mariana Islands, and the Trust Territory of the Pacific Islands (excluding the Marianas). The geographic detail within each report for a State or statistically equivalent area usually would vary from the level of an SMSA (standard metropolitan statistical area) to urbanized areas, counties, places by size, and minor civil divisions (especially towns and townships in selected States). Other products were published by type of geographic area, such as blocks or census tracts by SMSA and by State (also Puerto Rico) for blocks or tracts outside SMSA's. (Table C shows this distribution.) Series PC80-2 and HC80-3 were published by subject.

Following are descriptions of the preliminary, advance, and final published reports for 1980 population and housing statistics. For the publication dates, number of pages, and price per copy for the individual reports in the principal final series, see appendix 8A.

The preliminary and advance reports for 1980 differed from their 1970 counterparts; in 1980, only two series presented population and housing data together. In 1970, there had been four series of preliminary reports—three for population and one for housing—and three advance series—two for population and one for housing.

Preliminary Reports

Preliminary reports were prepared from the population and housing counts sent in by the district offices when the field enumeration was completed. Preliminary counts were shown for 1980 and, for comparison purposes, the final 1970 counts for the same areas.

Series PHC80-P, *Preliminary Population and Housing Unit Counts,* presented the counts for each State, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, American Samoa, and the United States. Preliminary counts for the Northern Mariana Islands and the remainder of the Trust Territory of the Pacific Islands were issued as press releases. The State reports included statistics for counties and county subdivisions, incorporated places, congressional districts, and SMSA's (standard metropolitan statistical areas). For SMSA's that had component parts in more than one State, data shown in the State report related only to that State's portion of the SMSA. The 56 reports ranged in size from 2 to 27 pages, and in price from $0.35 to $1 each, and were issued between November 1980 and February 1981.

Table B. 1980 Census Data

100-percent population items

* Household relationship
Sex
Race
Age
Marital status
* Spanish/Hispanic origin or descent

Sample population items

School enrollment
Education attainment
State of foreign country of birth
Citizenship and year of immigration
** Current language and English proficiency
** Ancestry
Place of residence 5 years ago
Activity 5 years ago
Veteran status and period of service
* Presence of disability or handicap
Children ever born
Marital history
Employment status last week
Hours worked last week
Place of work
** Travel time to work
* Means of transportation
** Persons in carpool
Year last worked
Industry
Occupation
Class of worker
* Work in 1979 and weeks looking for work in 1979
* Amount of income by source in 1979

100-percent housing items

Number of housing units at address
* Complete plumbing facilities
Number of rooms in unit
Tenure (whether the unit is owned or rented)
* Condominium identification
Value of home (for owner-occupied units and condominiums)
Rent (for renter-occupied units)
Vacant for rent, for sale, etc., and period of vacancy

Sample housing items

Number of units in structure
Stories in building and presence of elevator
Year unit built
* Year moved into this house
Source of water
Sewage disposal
Heating equipment
Fuels used for home heating, water heating, and cooking
* Costs of utilities and fuels
Complete kitchen facilities
Number of bedrooms and bathrooms
Telephone
Air conditioning
Number of automobiles
** Number of light trucks and vans
** Homeowner shelter costs for mortgage, real estate taxes, and hazard insurance

Derived items (illustrative examples)

Familes
Family type and size
Family income
Poverty status
Population density
Household size
Persons per room ("overcrowding")
Institutions and other group quarters
Gross rent
Farm residence

* Changed relative to 1970. ** New item for 1980.

Table C. Areas Summarized in Selected 1980 Reports

Areas	PHC80					PC80				HC80		
	–P	–V	–1	–2	–3	–1–A	–1–B	–1–C	–1–D	–1–A	–1–B	–2
U.S., regions, divisions[1]	X	X	–	–	–	X	X	X	X	X	X	[2]X
States	X	X	–	–	X	X	X	X	X	X	X	X
SCSA's	–	–	–	–	[5]X	X	X	X	X	X	X	–
SMSA's	[4]X	–	X	X	[5]X	X	X	X	[6]X	X	X	X
Urbanized areas	–	–	–	–	–	X	X	X	–	X	X	–
Counties:	X	X	[8]X	[7]X	X	X	X	X	–	X	X	–
Rural population by county	–	–	–	–	–	X	X	X	–	–	X	–
Farm population by county	–	–	–	–	–	–	–	X	–	–	X	–
Places (by population size):												
Under 1,000	[8]X	[8]X	[9]X	–	[8]X	X	–	–	–	–	–	–
1,000 to 2,500	[8]X	[8]X	[9]X	–	[8]X	X	X	–	–	X	–	–
2,500 to 10,000	[8]X	[8]X	[9]X	–	[8]X	X	X	X	–	X	X	–
10,000 to 50,000	[8]X	[8]X	[9]X	X	[8]X	X	X	X	–	X	X	–
50,000 and over	[8]X	[8]X	X	X	[8]X	X	X	X	[10]X	X	X	[11]X
County subdivisions:												
MCD's in 11 States[12]	X	X	[13]X	–	[14]X	X	X	[15]X	–	X	[15]X	–
MCD's in 9 States[16]	X	X	[13]X	–	[14]X	X	X	–	–	X	–	–
MCD's in 10 States and CCD's in 20 States	X	X	–	–	–	X	X	–	–	X	–	–
Census tracts	–	–	[17]X	–	–	–	–	–	–	–	–	–
Block numbering areas	–	–	X	–	–	–	–	–	–	–	–	–
Blocks	–	–	X	–	–	–	–	–	–	–	–	–
Congressional districts[18]	X	X	–	–	–	–	–	–	–	–	–	–
American Indian reservations/Alaska Native villages	–	–	–	–	–	–	X	X	–	X	X	–

Note: **Bold** indicates issued only on microfiche. – Means not applicable.

[1] Data are presented in separate U.S. Summary reports. [2] No divisions in HC80-2, U.S. Summary report. [3] Only the part within a given State is in PHC80-P and PHC80-3. [4] Only those SMSA's defined before the census. [5] Only SMSA's with 250,000 or more inhabitants. [6] Includes only those counties containing blocked areas. [7] Includes only those counties which have census tracts. [8] Incorporated places only. Census designated places excluded. [9] Only places in which statistics are collected by block. [10] Also includes central cities, regardless of size in SMSA's with 250,000. [11] Also includes central cities, regardless of size, in all SMSA's. [12] States in the Northeast region plus MI and WI. [13] Only MCD's in which data are collected by block. [14] Only those MCD's with active general purpose governments. [15] Only towns/townships with 2,500 or more inhabitants. [16] IL, IN, KS, MN, MO, NV, ND, OH, and SD. [17] Only census tracts containing blocks. [18] Districts of the 97th Congress in PHC80-V. In PHC80-4, districts of the 98th Congress and, where redistricting has occurred, the 99th and 100th.

Advance Reports

Advance reports presented counts of the population by race and Spanish origin together with housing-unit counts, before these data were published in the final reports, where some of the figures were superseded.

Series PHC80-V, *Final Population and Housing Unit Counts,* reports covered the United States and its regions and divisions, States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, and American Samoa, congressional districts, counties, county subdivisions, and incorporated places. Counts for the Northern Mariana Islands and the remainder of the Trust Territory of the Pacific Islands were issued as press releases. The 56 reports ranged in size from 6 to 60 pages, and in price from $0.35 to $1 each, and were issued in March and April 1981.

Final Reports

As noted on page 5, all but two of the printed series of final 1980 census data were issued in paperback reports (with appropriate maps), and no hardbound volumes were assembled as had been done for the 1970 and earlier censuses. Most reports for Puerto Rico were issued in Spanish as well as English.

Population—PC80-1, Volume 1, *Characteristics of the Population,* presented final population counts and statistics on population characteristics. It consisted of reports for the following 58 areas: The United States, each of the 50 States, the

District of Columbia, Puerto Rico, and the outlying areas—Guam, the Virgin Islands of the United States, American Samoa, the Northern Mariana Islands, and the remainder of the Trust Territory of the Pacific Islands. The volume consisted of four chapters for each area—A, B, C, and D. Chapters A and B displayed data collected on a complete-count basis, and chapters C and D contained estimates based on sample information, except for the outlying areas, where all data were collected on a complete-count basis.

Some population totals in chapters A and B differed from the earlier counts in the PHC80-V reports because corrections were made for errors (in geographic boundaries, allocations of population and housing units to enumeration districts, and the like) found after the latter had been issued. Chapters B, C, and D presented statistics by race and Spanish origin for areas (except Puerto Rico and the outlying areas, where race and Spanish origin were not asked) with a specified minimum number of the relevant population group.

The U.S. Summary reports offered statistics for the United States, regions, divisions, States, and selected areas below the State level. The State or statistically equivalent area reports (which included the District of Columbia, Puerto Rico, and the outlying areas) presented data for the area and its subdivisions.

Statistics for each of the 58 areas were issued in separate paperbound reports of chapters A, B, C, and D (or C and D combined) as detailed below.

PC80-1-A, Chapter A, *Number of Inhabitants*—Final counts were shown for the following areas or their equivalents: States, counties, county subdivisions, incorporated places and census designated places, SCSA's (standard consolidated statistical areas), SMSA's, and urbanized areas. Selected tables contained population counts by urban/rural and metropolitan/nonmetropolitan residence and by size of place. Many tables included population counts from previous censuses. The reports ranged in size from 23 to 108 pages (the U.S. summary was 289 pages) and price from $2.75 to $6, and were issued between October 1981 and January 1983.

Series PC80-1-B, Chapter B, *General Population Characteristics*—Statistics on household relationship, age, race, Spanish origin, sex, and marital status were shown where applicable for the following areas or their equivalents: States, counties (by total and rural residence), county subdivisions, places of 1,000 or more inhabitants, SCSA's, SMSA's, urbanized areas, American Indian reservations, and Alaska Native villages. The 58 reports ranged in size from 38 to 814 pages, and in price from $3.75 to $13.00. They were issued between April 1982 and July 1983.

Series PC80-1-C, Chapter C, *General Social and Economic Characteristics*—Statistics were presented on nativity, State or country of birth, citizenship and year of immigration for the foreign-born population, language spoken at home and ability to speak English, ancestry, fertility, family composition, type of group quarters, marital history, residence in 1975, journey to work, school enrollment, year of school completed, disability, veteran status, labor force status, occupation, industry, class of worker, labor force status in 1979, income in 1979, and poverty status in 1979. Many of the variables were cross-tabulated.

Each subject was shown for some or all of the following areas or their equivalents: States, counties (by rural and rural-farm residence), places of 2,500 or more inhabitants, SCSA's, SMSA's, urbanized areas, American Indian reservations, and Alaska Native villages. The 54 reports ranged in size from 152 pages to 1,542 pages (the latter in two sections) and in price from $4.75 to $14. They were issued between July 1983 and September 1984.

Series PC80-1-D, Chapter D, *Detailed Population Characteristics*—Statistics on most of the subjects covered in the PC80-1-C report presented cross-classifications of final 1980 sample data on social and economic characteristics in 58 detailed tables drawn from STF 5. Data on most of the subjects covered in PC80-1-C were shown in considerably greater detail and cross-classified by age, race, Spanish origin, and other characteristics. Each subject was shown for the State, some subjects for rural residence at the State level, most for SMSA's of 250,000 or more population, and a few for central cities of these SMSA's. There also were reports for Puerto Rico and the Virgin Islands (without race or Spanish origin). The 54 reports ranged in size from 176 pages to 2,314 pages (the latter in four sections) and in price from $5.50 to $31. They were issued between October 1983 and January 1985.

Series PC80-1-C/D, *Detailed Population Characteristics*, combined elements of PC80-1-C and PC80-1-D for Guam, American Samoa, the Northern Mariana Islands, and the remainder of the Trust Territory of the Pacific Islands. The four reports ranged in size between 76 and 320 pages and in price between $3 and $9. They were issued in December 1984 and January 1985.

Series PC80-2, Volume 2, *Subject Reports*—Each of the reports focused on a particular subject and provided highly detailed distributions and cross-classifications on national, regional, and divisional levels. A few reports showed statistics for States, SMSA's, large cities, or American Indian reservations (and certain counties that contain the historic areas of Oklahoma). Separate reports were issued on such subjects as racial groups (Asians and Pacific Islanders; and on American Indians, Eskimos, and Aleuts from the supplementary questionnaire), rural and farm-related population (excluding urbanized areas), persons in institutions, families, marital status, migration, occupation by industry, place of work/journey to work, income, poverty status, and other topics. The reports ranged in size from 152 to over 3,000 pages (the latter in three sections), and in price from $5.50 to $72, and were issued beginning in June 1984. The report on occupation by industry (No. 7A) was also released on tape (November 1986).

Series PC80-S1, *Supplementary Reports*, comprised about 20 reports that presented various types of population data, such as special compilations that could not be accommodated in the regular final reports, and selected tables from large reports. This permitted distribution of the particular figures in

an inexpensive format; most reports had less than 100 pages and sold in the $2-$4.50 price range. The largest exception was a report on the population and land area of urbanized areas for the United States and Puerto Rico—478 pages, $12. Other topics in the series included data on the Spanish-origin population and racial groups, congressional district profiles, gross migration for counties from 1975 to 1980, occupation by sex, population and housing counts for American Indian areas and Alaska Native villages, and population distributions for Asian and Pacific Islander detail groups. The reports were issued beginning in 1981. Similar supplementary reports were issued in the PHC (population and housing) series; see p. 8–22 below.

Housing—Series HC80-1, Volume 1, *Characteristics of Housing Units*—This volume presented final housing-unit counts and statistics on housing characteristics. It consisted of reports for the following 58 areas: The United States, each of the 50 States, the District of Columbia, Puerto Rico, and the outlying areas —Guam, the Virgin Islands of the United States, American Samoa, and the Northern Mariana Islands and the remainder of the Trust Territory of the Pacific Islands. The volume consisted of two chapters for each area, A and B. Chapter A offered data collected on a complete-count basis, and chapter B presented estimates based on sample information, except for the outlying areas, where all data were collected on a complete-count basis.

Some housing totals in this report differed from the counts presented earlier in the PHC80-V reports because corrections were made for errors (in geography, allocations to enumeration districts, and the like) found after the latter were issued. Both chapters presented statistics by race and Spanish origin (where applicable) for areas with a minimum number of the specified population group.

The U.S. Summary reports offered data for the United States, regions, divisions, States, American Indian reservations, Alaska Native villages, and other selected areas below the State level. The State or statistically equivalent area reports (which included the District of Columbia, Puerto Rico, and the outlying areas) presented tabulations for the State or statistically equivalent area and its subdivisions.

Statistics for each of the 58 areas were issued in separate paperbound reports of chapters A and B, as follows.

Series HC80-1-A, Chapter A, *General Housing Characteristics*—Statistics on units at address, tenure, condominium status, number of rooms, persons per room, plumbing facilities, value, contract rent, and vacancy status were shown for total housing units and for those with householders of specified race and Spanish-origin groups for some or all of the following areas or their equivalents: States, counties, county subdivisions, places of 1,000 or more inhabitants, SCSA's, SMSA's, urbanized areas, American Indian reservations, and Alaska Native villages. Selected tables contained housing characteristics by urban and rural residence. The 58 reports ranged in size from 38 to 870 pages, and in price from $3.75 to $14, and were issued between June 1982 and August 1983. (The Spanish-language version of the Puerto Rico report was issued in March 1984.)

Series HC80-1-B, Chapter B, *Detailed Housing Characteristics*— Statistics on units in structure, year moved into unit, year structure built, heating equipment, fuels, air conditioning, source of water, sewage disposal, gross rent, and selected monthly ownership costs, where applicable, were shown for some or all of the following areas or their equivalents: States, counties, places of 2,500 or more inhabitants, SCSA's, SMSA's, urbanized areas, American Indian reservations, and Alaska Native villages. Selected tables covered housing characteristics for rural and rural-farm residence at the State and county level. Some subjects included in the HC80-1-A series also appeared in these reports for rural and rural-farm housing units. The 58 reports ranged in size from 36 to 609 pages and in price from $2.25 to $8.50, and were issued between July 1983 and July 1984. The Puerto Rico report was published in separate English and Spanish versions.

Series HC80-2, Volume 2, *Metropolitan Housing Characteristics*—This volume presented statistics on most of the 1980 housing census subjects in considerable detail and cross-classification. Most statistics were by race and Spanish origin, where applicable, for areas with a large number or percentage of the specified population group. Data were shown for States or equivalent areas, SMSA's and their central cities, and other cities of 50,000 or more inhabitants. There was one report for each SMSA and one for each State and Puerto Rico. The set included a U.S. summary report showing these statistics for the United States and regions. The 380 reports ranged in size from 67 to 1,108 pages (the latter in two sections) and in price from $2.50 to $18. The reports were issued between October 1983 and October 1984.

Series HC80-3, Volume 3, *Subject Reports,* consisted of six reports (subsequently reduced to five), each concentrating on a particular topic (see app. 8A). They provided detailed information and cross-relationship, generally on national, regional, and State levels. The first report was issued in October 1984.

Series HC80-4, Volume 4, *Components of Inventory Change,* consisted of two reports offering data derived from a sample survey, in the fall of 1980, on the source of the 1980 housing inventory and the disposition of the 1973 inventory. Characteristics of housing units as of 1980 were shown for 1980 units that existed in 1973, as well as on newly constructed units, conversions, mergers that still existed in 1980, and other additions to the housing inventory. Characteristics as of 1973 were shown for units lost by 1980 through demolition, disaster, merger, mobile homes moved out, and other losses. Data appeared for the United States and regions in report I. Report II had two parts—A, data for that group of SMSA's (not individually identified) with populations of 1 million or more at the time of the 1970 census, and B, statistics for that group of SMSA's with

populations of less than 1 million at the time of the 1970 census. The reports (see app. 8A) were issued in October 1983 and January 1984.

Series HC80-5, Volume 5, *Residential Finance,* consisted of one report presenting statistics on the financing of privately owned nonfarm homeowner and rental and vacant properties, including characteristics of the mortgage, property, and property owner. The statistics were based on a sample survey conducted in the spring and summer of 1981. Data were shown for the United States and regions, by inside and outside SMSA's and by central cities. The single report (see app. 8A) was issued in January 1984.

Series HC80-S1, *Supplementary Reports,* consisted of two brief reports that provided statistics from the 1980 Census of Housing on general characteristics of housing units for the 50 States, the District of Columbia, counties, and independent cities. The reports (see app. 8A) were issued in October 1981 and June 1983.

Population and housing—Series PHC80-1, *Block Statistics*—These reports, which were issued on microfiche rather than in print form, presented population and housing-unit totals and statistics on selected characteristics based on complete-count tabulations. Data were shown for blocks in urbanized areas and adjacent territory, for blocks in incorporated places of 10,000 or more inhabitants, and for blocks in areas for which State or local governments contracted with the Census Bureau to provide block statistics.

The set of reports consisted of 374 sets of microfiche and included a report for each SMSA's block-numbered areas, and a report for each State and for Puerto Rico, for the block-numbered areas outside SMSA's. In addition to microfiche, there were printed detailed maps showing the blocks covered by the particular report, as well as a U.S. summary that was an index to the set. The U.S. summary (1) was issued in March 1983 as a paperback report that included 245 county subdivision maps illustrating the block-numbered areas' coverage in each State, and as a microfiche report without the maps. The reports ranged in size from 28 to 882 pages; price was based on the number of fiche in one order, but the entire set of 567 fiche could be purchased for $226.80. The block-numbered maps were printed on paper as well as on fiche and were sold separately for each report. The reports (except the U.S. summary) and maps were issued between February and December 1982.

Series PHC80-2, *Census Tracts*—These were complete-count and sample statistics for most of the population and housing subjects included in the 1980 census for census tracts (statistical subdivisions of counties, averaging 4,000 inhabitants) in SMSA's and other tracted areas. Most data were by race and Spanish origin, where applicable, for areas with a specific minimum number of persons in the relevant population group. There was one report for each SMSA, as well as one for Puerto Rico and each State that had census tracts outside SMSA's. In addition, maps showed the boundaries and identification numbers of census tracts in the county. A U.S. summary served as an index (without maps) to the set. The 373 reports—some with several parts—ranged in size from 71 to 888 pages (one of four New York, NY SMSA sections) and in price from $4.75 to $23 (for a four-section set). They were issued between July and November 1983.

Series PHC80-3, *Summary Characteristics of Governmental Units and Standard Metropolitan Statistical Areas,* displayed statistics on total population and on complete-count and sample population characteristics such as age, race, education, disability, ability to speak English, labor force, and income, and on total housing units and housing characteristics such as value, age of structure, and rent. These statistics were shown where applicable for the following areas or their equivalents: States, SMSA's, counties, county subdivisions (those which were functioning general-purpose local governments), and incorporated places. There was one report for each State, the District of Columbia, and Puerto Rico; there was no U.S. summary. Report size ranged from 38 to 246 pages and in price from $4.50 to $7.50. Most reports in the series were issued between October and December 1982; the Puerto Rico report appeared in June 1983.

Series PHC80-4, *Congressional Districts of the 98th Congress,* presented selected 1980 complete-count and sample population and housing data that reflected redistricting for the 1982 elections, together with maps showing the boundaries of each district. One report was issued for each of the 50 States and the District of Columbia. They ranged in size from 57 to 157 pages and in price from $4.75 to $6.50 each, and were released between March and May 1983. Another series, carrying the same PHC80-4 designation but titled *Congressional Districts of the 99th Congress,* covered the same items, but with data from STF's (summary tape files) 1H and 3H reflecting changes in 10 States where boundaries were redefined for the 99th Congress (1985-86). The reports (see app. 8A) had the same report numbers as their 98th Congress counterparts; they ranged in size from 57 to 164 pages and in price from $2.25 to $5.50. They were issued between May 1984 and March 1985. A third series report, *Congressional Districts of the 100th Congress,* Ohio (No. 37)—the only State to redistrict for this Congress—was issued in May 1986.

The 100-percent data contained in the PHC80-2, -3, and -4 series reports were tabulated at an earlier stage of processing than the sample data; the 100-percent tabulations then were held so that both could be released together in complete reports. To allow users earlier access to the 100-percent figures, the Bureau made the data available on photocopies of the prepared tables, at cost.

The PHC80-E series, *Population and Housing Evaluation Reports,* offered the results of the extensive evaluation program conducted as an integral part of the 1980 census, describing such matters as completeness of enumeration and quality of the data on characteristics. For the various components, see chapter 9. Four reports were issued; the first, on the coverage item, appeared in August 1985; the second, on the Content Reinterview Study, in October 1986; the third, on 1980 coverage improvement programs, in February 1987; and the fourth, on the population coverage itself, in February 1988.

Series PHC80-R was assigned to several general and reference reports pertinent to the 1980 census. They included the following:

1. The *Users' Guide,* published in 1982-83, covered subject content, procedures, geography, statistical products, limitations of the data, sources of user assistance, notes on data use, a glossary of terms, and guides for locating data in reports and tape files. The guide was issued in looseleaf form and sold in parts (R1-A, B, etc.) as they were printed.

2. This *History,* issued in parts (each containing one or more chapters) beginning in 1986, described in detail all phases of the 1980 census, from the earliest planning through all stages to the dissemination of data and evaluation of results. It included detailed discussion of 1980 census questions and their use in previous decennial censuses.

3. *Alphabetical Index of Industries and Occupations* was issued in a first edition in 1980 and in a final edition with the same name and similar scope in 1983. This report was developed primarily for use in classifying responses to the questions on the kind of business (industry) and kind of work (occupation) in which the respondent was engaged. The index, which listed approximately 20,000 industry and 29,000 occupation titles in alphabetical order, also was issued on tape.

4. *Classified Index of Industries and Occupations* was issued in a first edition in 1980 and in a final edition in 1982. This report defined the industrial and occupational classification systems adopted for the 1980 Census of Population. It presented the individual titles that constituted each of the 231 industry and 503 occupation categories in the classification systems. The individual titles were the same as those shown in the *Alphabetical Index* and arranged by category. The 1980 occupation classification reflected the new U.S. standard occupational classification (SOC). As in the past, the 1980 industry classification followed the standard industrial classification (SIC).

5. *Geographic Identification Code Scheme,* issued in 1983, identified the name and the related geographic code(s) for each region, division, State, county, minor civil division, census county division, place, SCSA, SMSA, urbanized area, American Indian reservation, and Alaska Native village for which the Census Bureau tabulated data from the 1980 census.

There were two other reference products, published in paper form, that were not assigned to the "R" series:

Census Tract Street Indexes were computer printouts covering the GBF/DIME (geographic base file) portions of the 278 SMSA's existing in 1978. Each index provided an alphabetic listing of street names and address ranges within census tracts, by county and ZIP Code, thus allowing users such as financial institutions to assign tract and ZIP Codes by hand. Local agencies compiled the GBF/DIME files in 1977-78, and the Bureau developed the indexes from them in 1977-78, for use in coding place-of-work responses on the 1980 census questionnaires. The printouts were copied onto microfiche for sale to users beginning in May 1980. Customers could order either fiche or paper "blowbacks" from the fiche.

The *Congressional District Atlas* reflecting 1980 census data was published in 1983 for the 98th Congress (1983-84), in 1985 for the 99th Congress (1985-86), and the 100th (1987-88) in 1987. These reports presented State and inset maps showing the boundaries of the congressional districts for the Congresses in question and listings identifying the districts in which counties and incorporated municipalities within each multidistrict State were located. The boundaries shown were those specified in laws and/or court orders based on 1980 census results or other considerations.

Series PHC80-SP, *Special Reports,* included the *Neighborhood Statistics Program* (NSP), which the Bureau developed in 1982 to assist localities asking for statistics covering recognized subareas, generally called "neighborhoods." Participation in the NSP was on a voluntary basis and was restricted to areas with census blocks. (See also app. 3A in ch. 3.) The neighborhood publication area (NPA) was defined in terms of aggregations of census blocks by a local contact person designated by the highest elected official in each jurisdiction in the NSP. The NSP report series consisted of individual reports for each NPA. Each NSP report consisted of a separate text booklet for each State, the District of Columbia, and Puerto Rico, followed by 11 detailed data tables of complete-count and sample population and housing statistics, a narrative profile for each neighborhood, and a geographic definition (such as certain blocks or census tracts) of the neighborhoods. Approximately 75,000 pages were published on microfiche for 1,252 jurisdictions (27,848 neighborhoods) in the States and the District of Columbia, plus 40 jurisdictions and 439 neighborhoods in Puerto Rico, between the summer of 1983 and the fall of 1984. Users could also order paper copies of the fiche.

Series PHC80-S, *Supplementary Reports,* was designed as a vehicle for miscellaneous topics. Some reports provided advance release of data published elsewhere and others, unique data. (See also PC80-S1 reports on p. 8–18 above.)

S1-1, *Provisional Estimates of Social, Economic, and Housing Characteristics* offered provisional estimates based on sample data collected in the 1980 census. Data on social, economic, and housing characteristics were shown for the United States as a whole, each State, the District of Columbia, and SMSA's of 1 million or more inhabitants. These statistics were based on a special subsample of the full census sample. The subsample, which represented about 1.6 percent of the total population, was developed to provide users with initial sample data on characteristics of the population and housing units for the Nation and large areas. The 149-page report was issued in April 1982; the price was $6.50.

S2, *Advance Estimates of Social, Economic, and Housing Characteristics,* contained advance sample data from the 1980 census, including such social and economic characteristics of the population as education, migration, labor force, and income, as well as housing characteristics such as structural information, mortgage, and gross rent. Each report presented population and housing characteristics for the State, its counties, and places of 25,000 or more inhabitants. Selected data based on the full census sample were shown for four race groups (White; Black; American Indian, Eskimo, and Aleut; and Asian and Pacific Islander) as well as for persons of Spanish origin. The 51 reports, one for each State and the District of Columbia, ranged in size from 47 to 332 pages and in price from $4.75 to $9. They were issued between September 1982 and April 1983.

DECENNIAL PUBLICATION MAPS

Introduction

The mapping services that supported Bureau of the Census operations can be grouped into three major categories: (1) Internal maps produced for use in various activities such as field enumeration, local review, and statistical-area delineation; (2) publication maps that appear in or accompany printed reports, microfiche, summary tape files, and other forms of product releases; and (3) special-request maps, produced on a cost-reimbursable basis, in support of other Federal agency programs, commercial requests, and so forth. This section addresses only the publication map products—the maps printed as part of reports and those issued as thematic wall maps, both of which were reproduced in large quantities using printing plates generated from negatives. (For a discussion of (1), see ch. 3; (3) is not within the scope of this history.)

The 1980 publication maps program's objective was to provide the most legible and accurate maps possible, packaged and distributed in such a manner as to offer the public the most convenient and inexpensive access to them. The maps were intended to satisfy the users' varied demands, but also had to be products that could be produced within the constraints of available resources. The Bureau predicated both the final design and content of each map series and the several types of map series it produced primarily on the consensus of user comments and suggestions, which it gleaned from meetings of professional and advisory groups, and correspondence resulting from public attendance at 1980 census preparation seminars and data-user conferences in which the staff participated.

The program, centered around the 1980 census maps, produced many copies of each of over 32,000 mapsheets. While one of the purposes was to provide a geographic framework and index for data collection (see (1) above), the program had to do the same for data dissemination. Therefore, the Bureau developed geographic coverage of the entire United States, Puerto Rico, and the outlying areas in several different formats. This provided census-data users with a choice of maps at various levels of detail to accompany the tabulations.

The publication map series produced for the 1980 census was divided into three generic categories based on the series' purpose—the 1980 census maps, summary reference outline maps, and statistical/thematic maps. These, as appropriate, showed boundaries as of January 1, 1980 (the official date for the boundaries recognized in the census). The maps also were available separately from the reports in or with which they were published, through direct purchase from the Census Bureau, at cost of reproduction, on paper, mylar, cronaflex, or 105mm microfiche.

To improve the 1980 census map products over their predecessors, the Bureau made major methodological changes between 1970 and 1980. The maps for the 1970 census (except for the Metropolitan Map Series (MMS)) and earlier reports were generally pen-and-ink products in which many types of information were drawn or lettered on a single sheet of paper. This technique was the commonly accepted method for map production until the 1960's, and the original staff in the Data Preparation Division's Geography Branch was proficient in applying it. To prepare the MMS for 1970, however, employees in the branch were trained in the more modern scribing and punch-registered negative-artwork overlay methodologies, which, because they were easier to master, produced a more consistent product, were not subject to the "mess" of ink, and, in the case of scribed products, eliminated at least one photographic step. In addition, the overlay technique allowed for greater flexibility in producing customized final products. Over time, the staff trained in pen-and-ink drafting methods dwindled through attrition and the current staff no longer could handle the volume of labor required to revise the old artwork or prepare new pen-and-ink artwork.

Two major criticisms of the map products in the 1970 reports were that the lettering was too small for most readers and that the map legends generally were incomplete, leading to confusion on the part of many data users. Furthermore, new Federal guidelines for map products required that metric values as well as English values be shown on map bar scales.

For all the above reasons, totally new artwork was prepared for the 1980 census reports. The decision to adopt the negative-overlay artwork system for all publication maps increased the amount of work required for the 1980 series, and thus the cost, but it nevertheless was more efficient. Basically, the system involved producing a base map and a series of artwork overlays in negative and positive form. The base was an engraved image in an emulsion-coated polyester film. Detail on the base comprised those features common to all maps produced. In the context of the Census Bureau's mapping program, the base map showed physical features, both natural and artificial. The overlays were created initially in either positive or negative form in registry with the base. Each overlay contained one or more categorized types of specific information to be shown in conjunction with the base, such as the names of the base features and the boundaries, names, and numeric identifiers of appropriate administrative and census statistical areas.

The negative-overlay artwork system for 1980, in contrast with 1970, provided greater flexibility in fulfilling the census mapping requirements, a more consistent product of better quality that was dimensionally stable, a longer life, and easier revision than products drafted in ink. It also afforded the Census Bureau the versatility of using the same artwork to produce maps of different appearance, either by changing the overlay tint screens, by adding or subtracting overlays, or by using the same base to prepare an entirely different map. The new artwork for 1980 was in a form that could be updated easily to produce publication maps for the 1990 census reports.

The Bureau encountered major problems throughout the publication map-making process that resulted in schedule slippage, high staffing levels, and budget overruns. Contributing factors ran the whole gamut from the initial planning to preparing the printer-ready copy. Since virtually all the 1980 publication map series were underway at the same time, there was great competition for staff resources, materials, and photographic and reproduction services to support artwork preparation. In addition, if one map series was used as a base for another series, work on the dependent map series had to be delayed until the parent map was available. For example, the county subdivision map series served as the base for the State SCSA/SMSA outline map series as well as the one that provided the State index maps for block-numbered areas.

At the peak of map production, staffing levels reached about 1,200 persons housed in six different buildings. As a consequence, workflow and material handling also became problems. Controls of map-preparation resource materials were inadequate; for example, there was no organized central area to receive and store the materials when they arrived. The materials often were kept in several different buildings and with different units within the same building. Project controls were insufficient, both in terms of monitoring the workflow and providing data for progress reporting. This situation was exacerbated by various priorities for releasing the data by State, depending on the report series, so that the map-preparation schedule had to be juggled to coincide with the availability of the tabulated data for publication.

Despite the difficulties faced in the mapmaking process, printer-ready copy was ready in time for inclusion in the various published report series. Except for the first two dozen State reports issued in the PC80-1-A series, the delays encountered in map production had virtually no adverse effect on the issuance of the report series. In fact, the census tract outline map series, which was printed separately from the data reports, appeared well ahead of the published tables.

Table D. Chart and Map Use in 1980 Census Final Reports, by Series

Charts				Maps			
Color		Black and white		Color		Black and white	
PC80-1-A1 PC80-1-B1 PC80-1-C1 HC80-1-A1 HC80-1-B1	U.S. summary only	PC80-1-A PC80-1-D1 HC80-1-A HC80-5	State reports U.S. summary State reports	PC80-1-A1 PC80-1-B1 PC80-1-C1 HC80-1-A1 HC80-1-B1	U.S. summary only	PC80-1-A PC80-1-B PC80-1-C PC80-1-D HC80-1-A HC80-1-B HC80-2 HC80-3 HC80-4 HC80-5 PHC80-1 PHC80-2	State reports State reports and U.S. summary State reports

1980 Census Maps

These maps were the basis for all other maps the Census Bureau produced, because they were the tools used in the original data-collection processes. They depicted no data per se, but showed the names and boundaries of the geographic areas to which users could relate the statistics. The 1980 census map coverage was divided into five map series that, together, covered the entire United States, Puerto Rico, and the outlying areas. These five were the county, metropolitan/vicinity (MMS/VMS), place, place-and-vicinity, and American Indian reservation map series.

All five types of 1980 census maps fell into one of two categories, based on the level of the geographic hierarchy portrayed on each map—the block level and the enumeration district (ED) level. Maps that showed the census blocks (i.e., those for block-numbered areas) covered approximately 7 percent of the total U.S. land area but almost 78 percent of the total population. Between February 1981 and March 1982, the Census Bureau issued these maps in a printed format to accompany the PHC80-1 *Block Statistics* report series (see p. 8–20 above). The Government Printing Office (GPO) published and sold the individual reports and their corresponding maps separately rather than in a single, combined version as they had been in previous censuses. The GPO also reproduced the maps on 105mm microfiche for the Government depository libraries.

For the remainder of the United States (as well as for Puerto Rico and the outlying areas)—the nonblock-numbered areas—the maps displayed the geographic hierarchy down to the ED level. Generally, this coverage encompassed the country's less populated areas. These maps were not included in any publication report series, but the Bureau provided copies at the cost of reproduction. Table E shows the distribution of individual 1980 census mapsheets by block-numbered (published) and nonblock-numbered (unpublished) areas within each map series.

A brief description of each map series follows. The block statistics reports also included two index-map series: the State index to block-numbered areas and the SMSA index to block-numbered maps. These two indexes were summary reference maps (discussed below), but are mentioned here because of their relationship to the PHC80-1 *Block Statistics* maps and reports.

Table E. **1980 Census Maps: Block-Numbered and Nonblock-Numbered Mapsheets by Series**

Series	Block-numbered	Nonblock-numbered	Total
Total	11,383	20,432	31,815
County	517	4,779	5,296
MMS/VMS	8,112	2,768	10,880
Place	1,465	10,820	12,285
Place-and-vicinity	1,289	1,965	3,254
American Indian reservation	0	100	100

County map series—This series was the primary component of 1980 census map coverage. Theoretically, a complete set of these mapsheets showed the census's overall geographic framework for the Nation, Puerto Rico, and the outlying areas. Most mapsheets in this series were at a scale of 1 inch = 1 mile (1:63,360). They were created by superimposing census boundaries and names over a base map of each county (or statistically equivalent area). Because the maps usually were supplied by State transportation or highway departments, map format varied; the Census Bureau therefore deleted extraneous information that enumerators might have found irrelevant or confusing. The symbolization and typographic systems for information added to the map base used the standard 1980 census conventions. (Larger scales and use of standard census symbology and type were improvements from the 1970 version.) County mapsheets adequately showed detail in rural areas, but the scale was not sufficiently large for densely settled villages, cities, urbanized areas, and the like. For these, the Census Bureau developed other map series; the portions of counties where such alternate coverage was provided were shaded on the county mapsheets, and those map series were regarded as insets to the county maps.

Metropolitan map series and vicinity map series (MMS/VMS)—The Census Bureau devised its own series of maps—the MMS—for the core (developed) portions of SMSA's in order to provide uniform coverage of the more densely settled areas of the counties involved. Similar maps for highly populated nonmetropolitan areas were identified as the VMS. In the few instances where these sheets entirely covered a county, no separate county mapsheet was issued. The political and statistical information on these maps included all components of the basic census geographic hierarchy. The political information portrayed included boundaries and names for international, State, county, minor civil division (MCD) and subdivision (sub-MCD), incorporated place, Alaska Native village, and American Indian reservation areas. Statistical areas represented on these maps included urbanized area, census county division (CCD), unorganized territory, census designated place (CDP), census tract or block-numbering area (BNA), enumeration district (ED) (where appropriate), and block (where appropriate). The predominant scale for the MMS/VMS was 1 inch = 1,600 feet (1:19,200). In selected areas with very dense development, some mapsheets were produced at a scale of 1 inch = 800 feet (1:9,600); conversely, some sparsely settled areas were mapped at a scale of 1 inch = 3,200 feet (1:38,400) or even 1 inch = 6,400 feet (1:76,800). Within the overall framework of census geography, the MMS and VMS were considered to be detailed insets to the county map coverage.

The Census Bureau designed and produced all maps in the MMS/VMS series from base information depicted on U.S. Geological Survey (USGS) quadrangle maps, and updated them from a variety of source material obtained from State highway departments, local planning agencies, and the like. Symbolization for these two series was standardized. Varying

line symbols and screen values provided the symbolization mode for these predominantly black-and-white maps. A standardized typographic system was used for all geographic information. A typical mapsheet covered about 30 square miles and measured 14" x 24".

There were three major changes in the series since the 1970 census: A larger scale and a half-quad format were used, and several layers of boundary information deemed not critical for these maps were deleted, thereby producing a less cluttered, easier-to-read map. For selected mapsheets within 19 SMSA's with the most complex legal boundaries, color tints were added to aid the map reader in distinguishing the intricate corporate limits.

Place map series—The Census Bureau developed this series for places not covered by MMS or VMS sheets, and where most of the development was contained within the limits of an incorporated place or the boundaries established for a census designated place. As with the MMS and VMS sheets, place maps were considered to be insets to the county mapsheets. Most place mapsheets were created by superimposing census boundaries and names over base maps (supplied by local or State governments) after extraneous information had been deleted. In selected cases, the Census Bureau drew its own base map, using the local maps only as source material.

The variety of base maps for this series necessarily implied a variety of scales and formats, depending on the source agency. The base-map symbolization also varied from map to map. All census information was symbolized using the standard 1980 census map typographic and symbolization systems. Major differences between the 1970 and 1980 versions included the use of standard census symbol and type conventions, and a greater proportion of Census Bureau-prepared base maps.

Place-and-vicinity map series—This series was basically identical to the place map series except for minor distinctions in coverage. It was created for places that had fairly dense development outside corporate boundaries and were not covered by the MMS/VMS. This category also included incorporated places that contained enclaves of unincorporated territory within their outer perimeters, and mapsheets that showed two or more adjacent places on a single map. In all other respects, place-and-vicinity mapsheets had the same characteristics as place mapsheets, and were considered to be insets to the county mapsheets.

American Indian reservation map series—For 20 American Indian reservations outside MMS/VMS coverage, the Census Bureau developed special maps to better identify roads and trails in these sparsely populated areas. The maps showed the 1980 census boundaries for counties, MCD's/CCD's, places, ED's, and, of course, Indian reservations. Approximately 100 mapsheets were produced on paper and mylar for the areas covered. The Bureau of Indian Affairs' *Atlas of Indian Reservations* was the map base for most of the 20 reservations, but where it was known to be outdated, aerial photographs were used as (or supplemented) the map base. The reservation maps, which were very similar to the county mapsheets in format and content, were insets to the county mapsheets. The major difference was that they exclusively covered only the 20 American Indian reservations, and did not depict any other geographic areas and their boundaries.

Summary Reference Outline Maps

The second major category of publication maps comprised the summary reference outline maps, of which there were nine different types. These maps did not show any data in and of themselves, but assisted users who worked with census tabulations in locating the legal and statistical areas to which the data referred. Unlike the 1980 census maps, which contained all levels of the census geographical hierarchy and depicted street and road patterns in considerable detail, the summary reference maps were generalized. Each of these outline map series focused on a geographic entity based on the specific level of geographic information represented by the statistics in the particular published report series. One map series focused on urbanized areas, another on census tracts, a third on SMSA's, and so forth. As the title implies, their purpose was to portray the specific areas for which the Census Bureau tabulated information from the decennial census. They generally were produced in black and white, at much smaller scales than the 1980 census maps, to accompany the major report series; however, many of these maps also were available separately from the publications in which they were originally included. Many of the map series appeared in more than one decennial publication; in addition, these publications often required more than one map series. All the reference outline maps were prepared between March 1980 and September 1982, timed to coincide with the publication schedule of the reports for which they were prepared. The series that supported the 1980 publication program are summarized below.

U.S. county outline map—This was a single-sheet map, 35" x 42", that displayed the January 1, 1980 boundaries for all States, the District of Columbia, Puerto Rico, and the outlying areas. It showed the boundaries and names of all counties and statistically equivalent areas, and was the base map for the thematic GE-50 map series (see below). It was issued in two versions; one used black ink only, and the other, black ink for State boundaries and nonphotographic blue ink for county boundaries and names. Both versions were issued at a scale of 1:5,000,000.

SCSA/SMSA outline map series—This series of State maps showed county names and boundaries, the names and boundaries of SMSA's and SCSA's, and the names and locations of the State capitals, all places with a population of 25,000 or more, and SMSA central cities with fewer than 25,000 inhabitants. This series was prepared by reducing the county subdivision base (see below) and producing an entirely new set of artwork showing selected categories of information.

In final form, each State and statistically equivalent area was presented on a single page showing the SCSA/SMSA boundaries and names by solid and screened symbology, respectively. The maps included international, State, and county boundaries and names, plus the locations and names of the places noted above. Places were symbolized with four different dot symbols representing four population classes, plus the State capital if it contained fewer than 25,000 inhabitants. The maps displayed adjacent State names and referencing ticks for adjacent county boundaries located in adjacent States. The scale for each map was based entirely on the space available in the single-page format. The addition of boundaries, all places of 25,000 or more inhabitants, and adjacent State names and State and county boundary ticks constituted the major changes for this map series since the 1970 census.

There were 58 page-size maps in this series, published in several report series: PC80-1-A, PC80-1-B, PC80-1-C, HC80-1-A, HC80-1-B, and PHC80-3.

U.S. SCSA/SMSA outline map—This was a single map showing the boundaries of SCSA's, SMSA's, States, and counties for the United States and Puerto Rico. Only the name of each SCSA and SMSA was shown; names of States and counties did not appear. This map was included in all reports containing SMSA data: PC80-1-A, PC80-1-B, PC80-1-C, PC80-1-D, HC80-1-A, HC80-1-B, and HC80-5.

State index to block-numbered-areas map series—This was a new series that was not produced for 1970. It used the county subdivision maps (see below) as the base, with all block-numbered areas indicated by screening (shades of gray) the applicable ones on the county subdivision map sections, thus providing a visual representation of the areas for which block data were available. Two screen values were used to represent areas block-numbered as (a) part of the 1980 urbanized-area program and (b) beyond the limits of that program. In addition, SMSA boundaries, symbolized as screened bands, allowed the map user to determine the report series in which to find the block statistics. This series consisted of 243 map sections. The maps were published by State as part of the *Block Statistics* map series (PHC80-1), with an index for each SMSA report and an overall index for selected area reports covering all non-SMSA areas.

SMSA index to block-numbered-areas map series—This series was published in the PHC80-1 *Block Statistics* reports in five page sizes. It provided a detailed index for block-numbered mapsheets within each SMSA. The original base maps were formatted by SMSA at artwork scales of 1 inch = 2, 4, or 8 miles (1:126,720, 1:253,440, or 1:506,880), the predominant scale being 1 inch = 2 miles. Mapsheets varied in size from 21" x 57" to 40" x 57". A total of 360 mapsheets were prepared for the 323 SMSA's identified for the 1980 census.

The political information portrayed included international, State, county, county subdivision, and place boundaries and names. The information added as an overlay to the political base included MMS sheet lines and numbers, and block-numbered area (BNA) information. The area was symbolized with two screen values, representing areas block-numbered either as a part of the urbanized-area program or beyond that program's limits.

These 1980 index maps differed significantly from the 1970 versions in several respects. The 1970 index maps covered only the urbanized-area portion of each SMSA, because block statistics were published by urbanized area. For the 1980 census, block data were issued by SMSA, so the index maps covered entire SMSA's.

County subdivision outline map series—This series presented the major higher levels of census geography in an easy-to-use format by State and statistically equivalent area. For all States, the District of Columbia, Puerto Rico, and the outlying areas, these maps showed the boundaries and names of the States and counties (and statistically equivalent areas), MCD's or CCD's, and all places recognized in the census.

The county subdivision outline maps were completely redesigned for publication with the 1980 census data. Major changes involved typography, scale, boundary-information detail, and the addition of a grid-referencing system. The series base was the USGS 1:500,000-scale State-base-map series, except for Alaska, Puerto Rico, and the outlying areas, which were at various scales. Census information—that is, county, MCD/CCD, and place names and boundaries—was obtained from the 1980 census maps to complete the compilation phase.

This multipurpose map series had totally new artwork, so that three versions of the map could be produced. The first version had 243 page-size sections that did not display American Indian reservations or Alaska Native villages. This version was published in the PC80-1-A State reports at scales varying from as large as 1 inch = 8 miles (1:506,880) to as small as 1 inch = 100 miles (1:6,336,000); half the States were shown at scales of 1 inch = 18 or 20 miles (1:1,140,480 or 1:1,267,200). The second version, published at the same scales, enhanced the sections to show the American Indian reservations and Alaska Native villages for which data appeared in the PC80-1-B and HC80-1-A State reports. The third version was a single-sheet wall-size map of one or more States (except California, which required two sheets) at the USGS scale of 1:500,000 (except for Alaska, Puerto Rico, and the outlying areas); some States were fitted together to form a multistate map. These maps did not show the American Indian and Alaska Native areas. The sheet size for most States was 42" x 60".

Urbanized area outline map series—This series consisted of one map for each urbanized area (UA) defined on the basis of the 1980 census. Each map showed the boundaries and names of all States, counties, county subdivisions, and places in the UA, as well as depicting (by shading) the land area defined as "urbanized." As in the 1970 census, there were three categories

of urbanized land area: urbanized incorporated places, urbanized census designated places, and urbanized unincorporated areas. The standard 1970 publication scale of 1 inch = 4 miles (1:253,440) was maintained, and metric units were added to the map scales.

These maps were published at page size in the PC80-1-A and HC80-1-A State reports. This resulted in some pages with one to four UA's to a page and other pages with only part of a single UA (which might be fragmented over as many as eight pages). An index map was included for multipage UA's. The report for each State containing part of a multistate "crossover" UA included the map of the entire UA; thus, a multistate UA could appear in as many as three State reports. There were 428 UA's (including duplications) shown on 214 published pages for 1980, compared with 252 UA's on 151 published pages in 1970. All the maps subsequently appeared in a combined UA special report, PC80-S1-14.

As in 1970, the same political base (that is, scribed base and type overlay) prepared for the SMSA block-numbered index map was used for the UA outline maps. Political-base artwork from more than one SMSA had to be combined where a UA existed in several adjacent SMSA's; where a UA appeared in both SMSA and non-SMSA areas, new political-base artwork had to be created.

One significant change from the 1970 version was an improvement in the maps' general appearance. Specifically, the use of photographic screening techniques and spread masks gave the map series a cleaner look. More major lakes and rivers were added as positional reference features. Another change was including the maps for multistate UA's in each of the respective State reports.

Census tract outline map series—This series covered each area for which 1980 census tracts were delineated. The maps showed all census tract boundaries, identified the features that constituted these boundaries, and displayed every tract's numeric identifier; they did not contain street detail within the tracts. Separate insets were made for densely populated areas; their scale varied from map to map, and fewer insets were used than for 1970. The census tract outline maps showed the boundaries and names for bordering nations and for States, counties, MCD's and CCD's, and all places (not just those over 25,000 population, as was done for 1970), together with the census tract boundaries and numbers. Census tract data were published by SMSA. (With the exception of a few SMSA counties and New England towns for which no tracts had been delineated, all SMSA's were covered completely by census tracts.) Maps also were prepared for non-SMSA areas with census tracts; these were always whole counties or groups of counties, except for those in New England that were partially within an SMSA; for the latter, only the non-SMSA part of the county was mapped separately.

Most maps were produced at a scale of 1 inch = 2 miles (1:126,720), with insets normally at a scale of 1 inch = 1 mile (1:63,360). The maps were published for use and sale with, but separate from, the PHC80-2 *Census Tracts* data reports. There were 544 areas mapped on 555 mapsheets, compared with 241 published maps for the 1970 census. Individual paper, mylar (reproducible), and microfiche copies were available from the Bureau at the cost of reproduction.

Congressional district outline map series—This series depicted the boundaries of congressional districts for the 98th, 99th, and 100th Congresses of the United States within the various States, and reflected the number of Representatives apportioned to each State based on 1980 census results. These maps were included in the *Congressional District Data Book,* the *Congressional District Atlas,* and the *Congressional District Data Reports* (PHC80-4).

There was a page-size State map of varying scale for each State, the District of Columbia, Puerto Rico, and the outlying areas. The base was the 1980 census State SMSA/SCSA map, except in the case of the six New England States and the District of Columbia, for which the county subdivision map base was used. When a county contained two or more congressional districts, the map was screened to indicate that an inset map would show the detailed boundary descriptions.

The State map contained the outline and name of each county or county equivalent, the State capital, and generally all places of 25,000 or more inhabitants. The map showed at least one place in every congressional district; this was the most populous one in the district, even if it fell short of the 25,000-inhabitant figure. When identification of all qualifying places made the maps difficult to read, only selected places were shown. There were 57 page-size State and other maps, plus 237 inset maps produced for this series.

For the 100th Congress, maps also were prepared for selected districts that crossed county lines; each map—often multipage—showed an entire district. These were published only in the *Congressional District Atlas.*

Statistical (Thematic) Maps

The third publication-map category was statistical or thematic maps—that is, maps generally depicting the distribution of, or changes in, specific demographic and nondemographic qualities of American life across geographic areas. These maps, providing material for studying spatial variations and the relative magnitude of given sets of census data, were published both as single-sheet wall maps, primarily in the GE-50 and GE-70 series, and at half-page, full-page, or two-page size to be bound in the various printed U.S. summary reports. Typically, the maps were multicolored and covered specific themes. Unlike the maps in the two other major categories, thematic maps generally were prepared only at the special request of a sponsoring subject-matter division within the Census Bureau.

In the past, the Bureau issued a number of maps in its GE-50 series (started in the early 1960's) and occasionally in its GE-70 series (which began in 1974) following a national census. The GE-50 series was intended for either wall display or desk use.

Each map (30"x42") was printed at a scale of 1:5,000,000, and depicted either the distribution of a socioeconomic characteristic or measure, or the boundaries of specific major areas of interest. Various color schemes were used to show significant characteristics of the distribution. The GE-70 series also was for wall display, but was published at a smaller sheet size (20"x30") and at a 1:7,500,000 scale. The GE-80 *Urban Atlas* series (established for the 1970 census) was abandoned for 1980 because of funding limitations.

The display maps were produced using conventional procedures that required resources of time and money, and involved deep-etch peelcoats to make open-window color separations in negative form. A separate peelcoat was prepared for each class interval. Part of the process was later automated, reducing the time required to prepare the separations, but a technician still had to intervene. The Census Bureau produced a number of these single-sheet wall maps following the 1970 census, but it issued only a few after the 1980 census. These included such topics as the current metropolitan statistical areas and congressional districts, and the distribution of urban and rural population. A number of page-size maps were produced for inclusion in the PC80-1 and HC80-1 U.S. summary reports.

Metropolitan statistical area (MSA) maps—Maps reflecting revised MSA's were issued in the GE-50 series in 1982 (No. 76), 1983 (No. 79), 1984 (No. 80), 1985 (No. 82), and 1986 (No. 84). The five releases reflected definitional changes announced by the Office of Management and Budget (OMB). GE-50 map No. 76 was similar to the ones produced during the 1970's, being based on the concept of SCSA's/SMSA's as defined for the 1980 census (using population estimates developed during the late 1970's) with qualification confirmed by the 1980 census counts. In 1983, however, the OMB implemented new standards for designating and defining MSA's; it changed the concept from SCSA/SMSA to MSA, including consolidated MSA (CMSA) and primary MSA (PMSA) to reflect refinements in the MSA definition. It also included the redefinition of metropolitan areas based on the results of the 1980 census. GE-50 maps Nos. 80, 82, and 84 were issued to incorporate additional OMB changes made in the ensuing years.

The 1983 map also reflected several major design changes over previous versions. Among the most notable changes were increasing the size of the overall map, depicting the MSA's in four population levels, showing UA areas, and using the reverse side of the map to identify the components and names of the MSA's in the six New England States in greater detail than could be shown on the parent sheet.

Congressional district maps—Maps depicting congressional districts were issued in the GE-50 series to show the districts in relationship to counties; separate maps were issued for the 98th (No. 77), 99th (No. 81), and 100th (No. 85) Congresses. The 98th Congress was the first one reapportioned on the basis of the 1980 census results. The 99th Congress was mapped because a large number of States changed their 98th Congress districts. To mark the occasion of the 100th Congress as an historical event (200 years of national population representation), the Census Bureau developed a special commemorative map. In addition to the standard rendering of congressional districts (only one State—Ohio—had changed for this Congress), the reverse side of the map had a series of maps depicting congressional district development from the 1st Congress in 1787 through the 25th, 50th, and 75th, culminating with the 100th Congress in 1987. Special colors, borders, and paper were used to make this map unique and informative.

Population distribution map—This map was issued in both the GE-50 and GE-70 series. The GE-70 map (No. 4) showed the 1980 distribution of the Nation's population as if viewed at night from a high-altitude satellite This 40" x 29" "nighttime" map had a navy blue background, with the Nation shown in a darker midnight blue and the population distribution in white. The map was later reissued as GE-70 map No. 6 (30" x 20"), but the printer camera copy for this edition was produced almost entirely by automated means (only the text was placed manually) on the National Oceanic and Atmospheric Administration's laser plotter, a raster device.

A "daytime" version of this map also was issued in the GE-50 series (No. 83). This 45" x 36" map depicted the distribution of urban and rural population, but in the more traditional manner. The 1980 map was vastly different from its 1970 and previous versions, which showed population by dot distribution and graduated circle techniques; the 1980 version combined dot distribution with classed choropleth techniques, and various symbols (squares, circles, triangles) distinguished urban and rural populations and the size of population concentrations. The 1980 population data were depicted in seven colors, categorized by three size classes of urbanized areas, two of urban places, and two of rural population. The map also showed data for the U.S. territories. The line work was created by conventional techniques; all thematic symbols were placed with computer-assisted techniques from data files, using a large-format, flatbed vector plotter.

Heating fuels map—This map presented changing patterns of home-heating fuels used by American households over four decades. The trend in type of such fuel used for census years 1980, 1970, 1960, and 1950 were color-coded by county according to the fuel used to heat most housing units in each county. There were four panels (one for each census) on a single mapsheet, 11" x 34".

U.S. summary outline maps—These were small-scale thematic maps covering a wide array of subjects for inclusion in the bound U.S. summary reports. They comprised a mixture of half-, full-, and two-page multicolored maps, each portraying one data topic. There were choropleth maps showing both the a real distribution and the change in distribution of a population or housing attribute; geographic outline maps that related to geographic summaries; and special-purpose maps, such as

one portraying the historical movement of the center of U.S. population by decade from 1790 to 1980, and others displaying the dates of admission of States and the acquisition of territories. The specific maps published in a given report depended on the data published. Statistical maps were included in the PC80-1 and HC80-1 U.S. summary reports.

THE PUBLIC LAW 94-171 PROGRAM

State and local governments use census data in determining the boundaries of congressional, State, and local legislative districts, and did so particularly after a series of Supreme Court decisions beginning in 1962 that required such districts to be relatively balanced in population. In the case of *Wesberry v. Sanders* (1964), for example, the Court ruled that "as nearly as practicable, one man's vote in a congressional election is to be worth as much as another's." This doctrine was extended to State and local elections as well. (In 1966, the Supreme Court ruled that race, as well as population, had to be taken into consideration when district boundaries were established.)

As early as 1972, Bureau planners began to meet with staff members of the National Conference of State Legislatures (NCSL) and State and local officials to see how well the 1970 census data had met their redistricting needs and to solicit their suggestions for 1980. In 1973, the NCSL's Reapportionment Committee (with Bureau involvement) surveyed legislative officials and their staffs, and the results were published in 1974 as a set of recommendations for planning the tabulations needed for legislative redistricting. The Bureau staff then worked with the Reapportionment Committee to carry out as many of the NCSL recommendations as possible.

In December 1975, Congress passed H.R. 1753, which was enacted as P.L. 94-171. This law included several requirements for the Bureau as well as for the States that chose to participate in this voluntary program for obtaining the census data necessary for reapportionment and redistricting. First, the law directed the Secretary of Commerce (and thus the Census Bureau) to issue a set of technical criteria by April 1, 1976, that the States would have to follow in specifying the geographic areas for which they wished to receive 1980 population tabulations. Second, the States were to submit these geographic plans to the Bureau for consideration not later than April 1, 1977. Third, the Bureau was to transmit the total population tabulations to the Governors and the public bodies having initial responsibility for legislative districting in all States by April 1, 1981—a year after Census Day 1980. The Bureau issued the necessary criteria on March 31, 1976, and Bureau and NCSL staff met with legislative officials in the 50 States to discuss the requirements and the particular States' possible interests in participating in the P.L. 94-171 program. The NCSL also provided each State with "model" legislation that might be enacted to ensure that the boundaries of election precincts (or similar areas) would follow visible ground features and adhere to the other technical guidelines.

By the April 1, 1977 deadline, 17 State legislatures had submitted geographic plans, although one State (California) subsequently withdrew its plan and two others had their plans returned because they did not conform with the technical criteria. The remaining 14 State plans were approved after extensive review and consultation with the States over a 2-year period. In May 1977, officials of nonparticipating States were contacted and apprised of other ways in which the Bureau could provide the data they needed. For example, States that could not "freeze" precinct lines in time to participate in the P.L. 94-171 program could receive census block statistics cumulated to precincts or similar areas. Another possibility would be to participate in delineating the boundaries of 1980 census enumeration districts (ED's) with legislative districts in mind. Five States submitted ED plans for portions of their areas, and two others asked the Bureau to hold legislative district boundaries in selected counties as ED boundaries where possible. A third way would be to take part in the Bureau's contract block program, and five States did so, contracting for such data for all areas not already covered in the Bureau's regular blockstatistics program. The remaining States then were scheduled to receive population tabulations only for the political and statistical areas customarily recognized in the 1980 census.

In February and March 1981, the Bureau delivered the P.L. 94-171 population counts on computer tape, microfiche, and paper to the official recipients in each State (one designated by the Governor and one designated by the legislature or other official body responsible for redistricting/reapportionment) and the District of Columbia. These counts included total population, the five major race groups, and the number of persons of Spanish origin for the State, counties, county subdivisions, incorporated places, election precincts or similar areas (in all or parts of 23 States), census tracts, block groups, blocks, and ED's in nonblocked areas. The Bureau also provided 1980 census maps. Where requested, one set of mylar (reproducible) maps was furnished for all officials to share; otherwise, all designated count recipients also received paper map sets.

In general, the program worked well, although some officials felt that some of the participation criteria were too rigid—especially the one that precincts would have to have boundaries conforming to visible ground features. There were some complaints about map readability, and others about the lack of time: Some States had very tight schedules for producing their redistricting/reapportionment plans, and officials felt pressured to process the information they had received without resolving perceived differences between the census figures and their own.

PUBLIC-USE COMPUTER TAPES

The Census Bureau released several kinds of 1980 census data on tape for public distribution and sale: **Summary data** for specific geographic and statistical areas, down to the level of a census block or enumeration district; **special tabulations** on a reimbursable basis for customers needing particular data not

obtainable from the summary tapes; **microdata files**—samples of the basic census records for individuals, households, and housing units with all identification removed other than to an area of 100,000 or more population; **geographic reference products** (including printed-out versions of computer tapes); and still other **special-purpose products**, such as data for migration analysis.

All the 1980 tapes differed from their 1970 counterparts in density—1,600 and 6,250 bpi (bytes per inch), 9-track, labeled or unlabeled, EBCDIC (extended binary coded decimal interchange code) or ASCII (American standard code for information interchange), compared with the 1970 tapes, which were 556 or 800 bpi, 7-track, binary-coded decimal, or 800 bpi, 9-track, EBCDIC only. The 1980 summary tapes contained more tabulations by race and ethnicity, and included geographic area names as well as their codes, while the structure of the geographic identification segment of each record was standardized across all the summary tape series.

The first of the 1980 census products on tape sold for $110 a reel, with an additional charge for "stacking" multiple data files on one or more reels. On March 1, 1982, the price was increased to $140 a reel, and $165 per reel was established for "stacked" files. On November 1, 1986, the price was increased again, this time to $175; at the same time, the Census Bureau began offering priority service—up to 5 days with overnight delivery—at additional charge on certain products. Technical documentation describing the organization of each table, the various codes and characters used, and the nature of the logical records (the geographic identification and all the data fields for a given geographic area) normally was included with each file order; copies ordered separately ranged from $5 to $25.

Summary Tapes

For 1980, the Bureau produced a series of five summary tape files (STF's) for the United States, each State, and the District of Columbia, and in some cases for Puerto Rico and the outlying areas. These STF's, designed to provide population and housing statistics with greater subject and geographic detail than was feasible or desirable to show in the printed reports, corresponded to the five computer tabulation runs (see ch. 6) that generated the printed reports and STF's after appropriate review and the application of suppression routines where necessary. The first two files (STF's 1 and 2) dealt only with 100-percent (complete count) data derived from the response to the census questions asked for all households and housing units. The other three files presented tabulations of the full range of sample population and housing characteristics, often cross-tabulated by the sample counts for such 100-percent characteristics as sex, race, Spanish origin, or tenure. Since data from STF's 3, 4, and 5 were based on sample information inflated to represent the total population, data summaries for items in these files differed slightly from comparable summaries in STF's 1 and 2.

Table F gives an overview of STF's 1 through 5; it notes the related report series for each STF, the smallest geographic unit, the number of data cells per record, the subject items for which detailed summaries were given, and the type of data (complete count or sample estimates). The term "cells" refers to the number of subject statistics provided for each geographic area; the number of cells reflects the complexity of the file's subject content.

Table F. **Overview of 1980 Summary Tape Files (STF's)**

Legend: BG Block Group
ED Enumeration district
MCD Minor civil division
CCD Census county division
SMSA Standard metropolitan statistical area

STF	Related report series	Smallest geographic unit	Data cells per record	Detailed summaries by:
Complete-count Data:				
STF1	PC80-1-A; PHC80-1; part of PHC80-3 and -4	Block/ED	321	Total
STF2	PC80-1-B; HC80-1-A; part of PHC80-2	Tract, MCD/CCD, place of 1,000+	1,330 (Record A) 982 (Record B)	Record A for total. Record B repeated for: Total, race, Spanish origin
Sample Estimate Data:				
STF3	Part of PHC80-3 and -4	BG/ED	1,126	Total
STF4	PC80-1-C; HC80-1-B; part of PHC80-2	Tract, MCD/CCD, place of 2,500 +	5,000 (estimate for Record A) 3,500 (estimate for Record B)	Record A for total. Record B repeated for: Total, race, Spanish origin ancestry
STF5	PC80-1-D; HC80-2	Central city of SMSA, county of 50,000+, place of 50,000+	108,000 (estimate)	Repeated for: Total, race, Spanish origin

Each STF generally consisted of two or more files that provided different degrees of geographic detail and, in some cases, race/Spanish origin/ancestry cross-classification. For each of the tape files, there was a separate tape or tapes for each State, the District of Columbia, and Puerto Rico. These tapes were issued on a State-by-State basis and were followed by a national summary tape for the particular file. Selected files (STF 1 and STF 3) also were produced for Guam, the Virgin Islands of the United States, American Samoa, and the Northern Mariana Islands and the remainder of the Trust Territory of the Pacific Islands. (More complete descriptions of the STF's than given in the summaries below can be found in the specific files' technical documentation and in the PHC80-R1 *Users' Guide.*

In line with Bureau policy followed in the 1970 census, tapes in the 1980 STF 1 series were not released until their corresponding printed reports had been published. This policy was relaxed in July 1982 to accelerate release of STF's 2 and 3: The tapes were cleared when the corresponding reports were approved for publication and sent to GPO for printing (usually 4 to 6 weeks before they were issued). In all, approximately 1,100 reels of STF tape were released.

For files released by State, the number of reels per State varied, depending on such factors as the number of substate areas being reported and the tape density desired—either 1,600 or 6,250 bpi.

In February 1980, the Bureau released prototypes of STF's 1A, B, and C based on complete-count data collected in the 1978 census dress rehearsal in the Richmond, VA area, and hence called the "Richmond test tapes." (Plans to issue corresponding test tapes of STF's 2 and 3 in early 1981 were cancelled.) The purpose here was to give data users an opportunity to experiment with public-use tapes in the Bureau's 1980 formats before ordering the final products. The same STF's, except for 1B, also were made available on microfiche (including documentation). In June 1980, the Bureau also produced a tape formatted for the P.L. 94-171 population counts (see p. 8–29), again using the 1978 Richmond data.

What follows is a description of the final STF's in numerical order.

STF 1 provided 321 cells of complete-count population and housing data, summarized for the United States, regions, divisions, States, SCSA's, SMSA's, urbanized areas, congressional districts, counties, county subdivisions, places, census tracts, enumeration districts in unblocked areas, and blocks and block groups in blocked areas. The data included those shown in the PHC80-1, PHC80-3 (complete count), and PC80-1-A reports. STF 1A tapes were issued between September 1981 and March 1982, with one for Puerto Rico in May 1982. There was an STF 1 tape (one file only) for the outlying areas; it was released in October 1982. STF 1B tapes were issued between October 1981 and April 1982 (the early tapes were recalled in December 1981); there was an STF 1B for Puerto Rico, released in May 1982. The STF 1C national file was issued in July 1982, and the STF 1D for congressional districts, in May 1982. STF 1E (allowing comparison of 1970 data for North Dakota for CCD's with those for the townships used instead for 1980) appeared in May 1982. STF 1F (for school districts), with one tape for each State, was released in May 1983. STF 1G (for the Neighborhood Statistics Program) was issued as one tape for each State, beginning in June 1983, and the tape for Puerto Rico was released in August 1984. STF 1H was the equivalent of STF 1D (see above) for 10 States that had newly defined congressional district boundaries for the 99th Congress; one reel was issued for each State in May 1984.

STF 2 contained 2,292 cells of detailed complete-count population and housing data, of which 962 were repeated for each race and Spanish-origin group present in the tabulation area. Data were summarized for the United States, regions, divisions, States, SCSA's, SMSA's, urbanized areas, counties, county subdivisions, places of 1,000 or more inhabitants, census tracts, American Indian reservations, and Alaska Native villages. The data included those shown in the PHC80-2 (complete count), PC80-1-B, and HC80-1-A reports. The STF 2A tapes were released between February and July 1982, and a similar one for Puerto Rico in September 1982. STF 2B tapes appeared between February and September 1982. STF 2C tapes were issued between March and September 1982. STF 2D (a special tabulation for New York City) was released in October 1982.

STF 3 offered 1,126 cells of data on various population and housing subjects collected on a sample basis. The geographic areas covered were the same as in STF 1, excluding blocks. The data included those shown in the PHC80-3 (sample) reports. STF 3A tapes were issued between May and September 1982. Subsequently, several anomalies were discovered in the income tabulation (see ch. 12); the tapes were corrected and completely reissued in February 1983 together with a similar STF 3A for Puerto Rico and STF 3 for the outlying areas. STF 3B (for five-digit ZIP-Code areas within county for States and SMSA's [there was no STF 3B for Puerto Rico or the outlying areas]) was issued as a special tabulation to a consortium of data users in July 1982 and to the public in September 1984. (At 6,250 bpi, there was one reel per State, but the data could be "stacked" into seven reels for the United States.) STF 3C (the national file) was released in January 1983; as with STF 3A, correction and reissuance followed the next month. STF 3D (congressional districts) appeared in May 1983, and STF 3F (there was no 3E), a school-district file that paralleled STF 1F, was issued in May 1983. STF 3G (Neighborhood Statistics Program) tapes appeared between March and June 1983, with Puerto Rico following in September 1986. STF 3H (10 States with newly defined congressional districts for the 99th Congress) was released in April 1985.

STF 4 was the geographic counterpart of STF 2, but the number of cells of data was greater—approximately 8,400. STF 4 provided data covering virtually all of the population and housing subjects collected on a sample basis, as well as the

Table G. Number of Tape Reels for Selected 1980 Census Files

(United States, States, and the District of Columbia, only)

Source: Bureau *Catalog and Guide*

Geographic area	STF 1A		STF 1B		STF 2A		STF 2B		STF 3A	
	1600 bpi	6250 bpi	1600 bpi	6250 bpi	1600 bpi	6250 bpi	1600 bpi	6250 bpi	1600 bpi	6250 bpi
United States	32	13	230	86	135	38	126	51	105	43
Alabama	1	1	4	1	2	1	2	1	2	1
Alaska	1	1	1	1	1	1	1	1	1	1
Arizona	1	1	3	1	2	1	2	1	2	1
Arkansas	1	1	3	1	1	1	3	1	2	1
California	3	1	18	6	12	5	3	1	9	3
Colorado	1	1	3	1	2	1	1	1	2	1
Connecticut	1	1	3	1	2	1	2	1	2	1
Delaware	1	1	1	1	1	1	1	1	1	1
District of Columbia	1	1	1	1	1	1	1	1	1	1
Florida	2	1	11	3	5	2	2	1	4	2
Georgia	1	1	11	3	2	1	3	1	3	1
Hawaii	1	1	1	1	1	1	1	1	1	1
Idaho	1	1	1	1	1	1	1	1	1	1
Illinois	2	1	10	3	6	2	5	2	6	2
Indiana	1	1	6	2	3	1	3	1	3	1
Iowa	1	1	3	1	2	1	4	1	3	1
Kansas	1	1	3	1	2	1	4	1	2	1
Kentucky	1	1	2	1	2	1	2	1	2	1
Louisiana	1	1	4	1	2	1	2	1	2	1
Maine	1	1	1	1	1	1	2	1	1	1
Maryland	1	1	4	1	3	1	1	1	2	1
Massachusetts	1	1	6	2	3	1	2	1	3	1
Michigan	2	1	8	3	5	2	4	1	5	2
Minnesota	1	1	5	2	2	1	5	2	4	1
Mississippi	1	1	5	2	1	1	2	1	2	1
Missouri	1	1	5	2	2	1	3	1	3	1
Montana	1	1	2	1	1	1	1	1	1	1
Nebraska	1	1	2	1	1	1	3	1	2	1
Nevada	1	1	1	1	1	1	1	1	1	1
New Hampshire	1	1	1	1	1	1	1	1	1	1
New Jersey	1	1	8	3	4	2	2	1	3	1
New Mexico	1	1	2	1	1	1	2	1	1	1
New York	3	1	11	4	10	3	4	2	7	2
North Carolina	1	1	5	2	4	2	2	1	3	1
North Dakota	1	1	1	1	1	1	4	2	2	1
Ohio	2	1	9	3	5	2	5	2	5	2
Oklahoma	1	1	4	1	2	1	2	1	2	1
Oregon	1	1	3	1	2	1	1	1	2	1
Pennsylvania	2	1	13	4	7	2	7	2	6	1
Rhode Island	1	1	2	1	1	1	1	1	1	1
South Carolina	1	1	3	1	2	1	2	1	2	1
South Dakota	1	1	1	1	1	1	3	1	2	1
Tennessee	1	1	4	2	2	1	2	1	2	1
Texas	2	1	17	5	4	2	4	1	7	2
Utah	1	1	2	1	1	1	1	1	1	1
Vermont	1	1	1	1	1	1	1	1	1	1
Virginia	1	1	6	2	3	1	2	1	3	1
Washington	1	1	5	2	2	1	1	1	2	1
West Virginia	1	1	2	1	1	1	2	1	1	1
Wisconsin	1	1	5	2	3	1	5	2	3	1
Wyoming	1	1	1	1	1	1	1	1	1	1
Puerto Rico	–	–	–	–	–	–	–	–	–	–
Outlying areas	–	–	–	–	–	–	–	–	–	–

* To be determined.

STF 4A		STF 4B		STF 5A (Population)		STF 5A (Housing)		PUM Sample A		Geographic area
1600 bpi	6250 bpi	1600 bpi	6250 bpi	1600 bpi	6250 bpi	1600 bpi	6250 bpi	1600 bpi	6250 bpi	
430	108	800	210	*	118	*	66	*	22	United States
6	2	14	4	9	3	4	1	2	1	Alabama
1	1	5	2	2	1	1	1	1	1	Alaska
	2	6	2	5	2	2	1	1	1	Arizona
3	1	14	4	6	2	3	1	1	1	Arkansas
55	14	37	10	33	9	13	4	9	3	California
7	2	10	3	6	2	3	1	1	1	Colorado
5	2	9	2	12	3	3	1	2	1	Connecticut
2	1	3	1	2	1	1	1	1	1	Delaware
1	1	1	1	2	1	1	1	1	1	District of Columbia
18	5	24	6	18	5	7	2	4	1	Florida
6	2	21	6	9	3	4	1	2	1	Georgia
2	1	4	1	2	1	1	1	1	1	Hawaii
1	1	7	2	3	1	1	1	1	1	Idaho
19	5	29	8	14	4	6	2	4	1	Illinois
8	2	20	5	12	3	5	2	2	1	Indiana
3	1	16	4	7	2	3	1	1	1	Iowa
3	1	16	4	5	2	2	1	1	1	Kansas
4	1	16	4	6	2	3	1	2	1	Kentucky
6	2	15	4	9	3	4	1	2	1	Louisiana
2	1	7	2	4	1	2	1	1	1	Maine
8	2	12	3	7	2	3	1	2	1	Maryland
7	2	12	3	11	3	4	1	2	1	Massachusetts
12	3	27	7	18	5	7	2	4	1	Michigan
1	2	22	6	6	2	3	1	2	1	Minnesota
3	1	13	4	5	2	2	1	1	1	Mississippi
6	2	20	5	7	2	3	1	2	1	Missouri
1	1	7	2	3	1	1	1	1	1	Montana
2	1	12	3	3	1	1	1	1	1	Nebraska
2	1	4	1	3	1	1	1	1	1	Nevada
1	1	5	2	4	1	2	1	1	1	New Hampshire
11	3	21	6	14	4	5	2	3	1	New Jersey
3	1	7	2	4	1	2	1	1	1	New Mexico
25	7	29	8	23	6	7	2	6	2	New York
8	2	23	6	14	4	6	2	3	1	North Carolina
1	1	10	3	3	1	2	1	1	1	North Dakota
16	4	31	8	19	5	8	2	4	1	Ohio
6	2	13	4	5	2	2	1	2	1	Oklahoma
5	2	10	3	6	2	3	1	1	1	Oregon
13	4	36	9	18	5	7	2	5	2	Pennsylvania
2	1	3	1	4	1	2	1	1	1	Rhode Island
5	2	12	3	8	2	4	1	2	1	South Carolina
1	1	10	3	2	1	1	1	1	1	South Dakota
6	2	15	4	8	2	3	1	2	1	Tennessee
25	7	41	11	25	7	10	3	5	2	Texas
3	1	6	2	4	1	2	1	1	1	Utah
1	1	1	4	1	2	1	1	1	1	Vermont
7	2	20	5	11	3	5	2	2	1	Virginia
8	2	14	4	9	3	4	1	2	1	Washington
2	1	9	3	6	2	3	1	1	1	West Virginia
7	2	20	5	12	3	5	2	1	1	Wisconsin
1	1	4	1	2	1	1	1	1	1	Wyoming
–	–	–	–	–	–	–	–	–	–	Puerto Rico
–	–	–	–	–	–	–	–	–	–	Outlying areas

complete-count subjects. Some of the statistics were repeated for race, Spanish origin, and ancestry groups. Data were summarized for areas similar to those shown in STF 2, except that data for places were limited to those with 2,500 or more inhabitants. The statistics included those shown in the PHC80-2 (sample), PC80-1-C, and HC80-1-B reports. Except for five States with faulty master tapes, reels for STF 4A were issued between June and September 1983; the Puerto Rico tape (modified in the same manner as for STF 2A) appeared in August 1984. STF 4B tapes were issued during the same period. STF 4C was released in the summer of 1983, and STF 4D (New York City), in September 1983.

STF 5 contained over 100,000 cells of data on various population and housing subjects collected on a sample basis and provided detailed tabulations and cross-tabulations for States, SMSA's, counties, places of 50,000 or more inhabitants, and central cities. Most subjects (except for Puerto Rico) were classified by race and Spanish origin. The data included those shown in the PC80-1-D and HC80-2 reports. Separate files—5A Population, and 5A Housing—were issued for the States between September and December 1983 and comparable ones for Puerto Rico in July 1984. There was no STF 5B. STF 5C (national file) was released in March 1984.

Special Tabulations

Special tabulations were run from the 1980 census basic record tapes to meet users' unique needs on a cost-reimbursable basis. The user had exclusive use of the tabulation for 6 months after receipt, unless other arrangements were made; thereafter, the Bureau was at liberty to sell copies of the tape(s). Following is a representative list:

Topic or tabulation	Number of reels	
	6,250 bpi	1,600 bpi
STF 1F data by school district (National Center for Education Statistics (NCES))	2	4
STF 3F data by school district (NCES)	2	4
Poverty level and children (NCES)	–	–
Recruitment analysis (Department of Defense (DOD)	–	–
Mobilization analysis (DOD)	–	–
Equal Employment Opportunity (see p. 37) by age (DOD)	–	–
Age, sex, tribal affiliation, and Spanish surname for New Mexico and Arizona enumeration districts and counties (New Mexico State Tumor Registry)	1	1
Selected housing data by ZIP Code for Tennessee Valley Authority	1	1
Age, occupation, and industry, by residence and class of worker for States and SMSA's (National Occupational Information Coordinating Committee and Bureau of Labor Statistics)	1 SMSA 10 counties 1 New England SMSA	
Occupation by race and sex, classified separately by industry, earnings, and education (National Planning Data Corporation (NPDC))	10	30
Age by race and sex by nativity by Spanish origin, for States (Yale University)	2	6
Traffic zone package created for 200 SMSA's on a regional, State-wide, or single-SMSA basis	–	–
Households by income and age of householder, and owner-occupied units by value and age of householder for States, counties, census tracts, enumeration districts, and block-numbering areas (NPDC)	3	10
Detailed occupation by industry by class of worker for service delivery areas (Minnesota Dept. of Economic Security)	1	1
Migration data from STF 5 for selected counties in California (University North Carolina)	1	1
Characteristics of teachers at the national level (NCES)	1 U.S. 1 States	1 1
Displaced homemakers	1	1
STF's 2, 3, and 4 for labor market areas (Maine Bureau of Employment Security)	1	1

Public-Use Microdata Samples (PUMS)

For data users who wanted to design their own tabulations, the Census Bureau offered PUMS—computerized representations of the actual questionnaire responses, statistically selected from the basic record tapes, but with names, addresses, and any other identifying information removed to preserve confidentiality. The only geographic identification possible would be to an area (usually a State, SMSA, or county group) with population of a specified minimum size. The basic unit for this sample has always been the individual housing unit and its occupants, if any, or of individuals in institutions or other group quarters.

The Census Bureau first made microdata samples available after the 1960 census; the products, in the form of 1-in-1,000 and 1-in-10,000 extracts from the 1960 25-percent sample basic record tapes, were sold to users on tape or on punchcards. After the 1970 census, six different public-use samples were made available—three from the 1970 5-percent and three from the 15-percent sample for States, county groups and SMSA's with 250,000 or more population for any one unit or combination that was identified, and for neighborhoods identified only by State or region. Each of the six samples came in three "sizes"—a 1-in-100 primary sample and 1-in-1,000 and 1-in-10,000 subsamples. A 1-in-100 State sample was created from the 1960 census, with form and detail parallel to the 1970 version to make historical comparisons possible.

For 1980, there were three independently drawn subsamples of the full 19.4-percent census sample for the United States and Puerto Rico. The three subsamples were designated "A," "B," and "C," and each featured a different geographic scheme. The "A" sample identified divisions, States, most counties and selected SMSA's and places that had 100,000 population or more, and selected county groups. "B" covered some States, SMSA's of 100,000 or more population, selected county groups, and selected counties and places with 100,000 or more population, and provided a metropolitan/ nonmetropolitan breakdown. "C" had divisions, some States, selected places of 100,000 or more population, selected urban areas, and offered an urban/rural breakdown. "A" was a 5-percent sample, new for 1980—a selection nationwide of records for approximately 11 million persons and over 4 million housing units. "B" and "C" were 1-percent samples. The Bureau also produced 1-in-1,000 extracts of the microdata samples. The 1980 PUMS U.S. tapes were issued between March and October 1983, during which time there were certain recalls and re-releases to correct income codes and insert State FIPS (Federal Information Processing Standards) codes that were found missing in the "B" sample. The Puerto Rico files were released in January 1986. The number of tapes in the "A" sample is listed by State in table G; States were grouped on the "B" and "C" sample tapes and on the "A," "B," and "C" subsamples. Separate mapsheets were made available for the "A" and "B" samples in July 1983.

In May 1986, the Bureau issued a PUMS tape covering the supplementary questionnaire used on American Indian reservations and in the historic areas of Oklahoma (excluding urbanized areas). The questionnaire was limited to households that had received the regular short-form questionnaire in the census and had at least one American Indian, Eskimo, or Aleut member. The tape had records for about 3.7 percent of the entire American Indian population and the housing units in which they lived. (A summary tape file to cover the supplemental questions was issued in December 1986.)

Geographic Reference Products

A number of the 1980 census tape products were reference files and street-name/address-range listings, some including data, based on census geography. The Bureau developed the files originally as a means of allocating the collected data to their proper geographic areas by computer rather than by clerks. Several of the reference files contained varying hierarchical structures used in tabulating the data, and some could be used for computer mapping.

GBF/DIME (geographic base file/dual independent map encoding) files (see chs. 2 and 3) were developed to computer-code 1970 census addresses for the urbanized cores of metropolitan areas to their appropriate blocks, census tracts, etc., for enumeration and tabulation purposes. During the 1970's, the files were expanded from 80 areas to 278 for 1980; of these 278, 274 were digitized by the time of the 1980 census, and 4 were created in undigitized form expressly for the 1980 census. Each GBF/DIME record identified a segment of a geographic feature on a map by its node points, address ranges, and geographic units (block, census tract, place, MCD/CCD, and county). It included records for some nonstreet features, such as railroads, streams, and political boundaries as well as streets. Node points identified the intersections of those features. Latitude, longitude, and State plane coordinates were assigned to each node on the digitized files (which could be used for mapping); those positions were blank on the undigitized files. Each file covered the urbanized core of an SMSA, and ranged in size between 3,000 and 226,000 records.

The **Geographic Identification Code Scheme (GICS)** was issued on one reel of tape in the latter part of 1982. The GICS consisted of a listing of the names and numeric codes for States, counties, county subdivisions (MCD's/CCD's), places, etc., for which data were tabulated in the 1980 census, and paralleled the GICS printed report, PHC80-R5 (see p. 21).

The **Master Area Reference File** was really a series of files that corresponded to the master enumeration district list (MEDList)used in the 1970 census but in slightly different format. MARF 1 was an extract of STF 1 (see p. 31) data applied to a master list of geographic areas and related codes, arranged hierarchically from the State down to the block group or enumeration district level. To assist programmers outside the Census Bureau to develop their capacity to retrieve 1980 census data for their

own systems, it released a test tape based on the 1978 special census of Richmond, VA (a dress rehearsal for the 1980 Decennial Census; see ch. 2). The test tape was issued in 1980; MARF 1 for the United States (2 reels at 6,250 bpi or 6 reels at 1,600 bpi) was released in November 1981, and MARF 1 for Puerto Rico (1 reel), in December 1983.

MARF 2 added population centroid coordinates, land area, total population and housing-unit sample estimates and per capita income based on 1980 census sample returns, and FIPS (Federal Information Processing Standard) codes. MARF 2 for the United States (2 reels at 6,250 bpi or 6 reels at 1,600 bpi) was issued in September 1983, and for Puerto Rico (1 reel) in August 1984.

MARF 3 and MARF 4 were school-district equivalency files. MARF 3 contained geographic areas down to the level of block group and enumeration district from STF's 1A and 3A (see p. 31) as well as total population and housing-unit counts. MARF 4 was the same as MARF 3 except that the geographic areas went to the block level and came from STF 1B (see p. 31). MARF 5 was a ZIP-Code equivalency file, with items from STF's 1A and 3A. MARF 3 (2 reels at 6,250 bpi or 6 reels at 1,600 bpi) and MARF 4 (12 reels at 6,250 bpi or 56 reels at 1,600 bpi) were issued in January 1984, and MARF 5 (2 reels at 6,250 bpi or 6 reels at 1,600 bpi) was released in September 1984. There were no Puerto Rico equivalents for these files.

A 1-reel neighborhood equivalency file was created in the summer of 1983 to show the correspondence between 1,252 communities' locally defined neighborhood publication areas and their component neighborhoods and 1980 census geographic areas. A microfiche version of this tape was included with the technical documentation that accompanied STF 1G and 3G (see also the printed reports described on p. 21).

In the summer of 1981, the Bureau released a census-tract equivalency file on tape (1 reel) that it had created originally for internal use. This file provided rough comparability between 1970 census tracts and the ones delineated in late 1978 in preparation for the 1980 census (and vice versa), by State, county, and tract code for both censuses.

That fall (1981), the Bureau issued a 1-reel "County and MCD by ZIP Code" file that related ZIP Codes (as of 1979) to counties, SMSA's, and—in New England—to MCD's, as a byproduct of a file called DOZIP (district office—ZIP Code) used internally in the 1980 census. The file covered the 50 States and the District of Columbia.

The next summer (1982), the Bureau released a 1980 census county boundary file (1 reel at 6,250 bpi or 2 reels at 1,600 bpi). This file contained nearly 475,000 records showing FIPS State and county codes, alphabetic State and county names, 1980 census population counts, and geographic coordinates defining each county boundary.

The PUMS county group equivalency file, issued on one reel in the spring of 1983, contained the area names, numeric codes, and 1980 census population counts for the components (counties, MCD's, and place parts within counties) of each "A" and "B" public-use sample county group used in the 1980 census microdata files (see p. 35 above). Each county group was identified by a unique five-digit State and county group code combination. The file also was offered in microfiche.

The Census Bureau began issuing geographic reference tapes suitable for computer-mapping congressional districts in 1975. The first of these files, available only in 1,600-bpi or 800-bpi format, covered the 94th Congress. It gave the State FIPS code, the district number, and x-y coordinates. A similar 1-reel tape was issued in 1979 for the 96th Congress, and another for the 98th Congress in 1983; these were in 6,250-bpi and 1,600-bpi format. Thereafter, the Bureau began issuing congressional district *equivalency* files—for the 98th, 99th, and 100th Congresses in 1983, 1985, and 1987, respectively. The equivalency files, which contained two-digit congressional-district codes and State and county records, as well as lower levels of geography as required, equated each congressional district with the appropriate 1980 census geographic areas.

The *contiguous county* file (1 reel, 6,250 or 1,600 bpi) released in the summer of 1986 and updated in 1988, provided information on the relationship between adjacent counties (and statistically equivalent areas) in the United States. It showed several types of connectivity: physical adjacency (including those areas separated by water but linked by a bridge), those nearby but not adjacent, and economic integration (measured by one-way commuting flows of at least 2,000 people per day in 1980). The file had been prepared originally as an aid in validating 1975-1980 population estimates, and it contained FIPS State and county codes as well as area names.

The *map index* file (1 reel, 6,250 or 1,600 bpi) issued in the spring of 1982 related 1980 census map numbers to applicable geographic codes—FIPS State and county, MCD/CCD, place, and census tract/BNA (block-numbering area). This file also was created originally to help in internal census operations.

Other Tape Products

The 1-reel *Residential Finance Survey, 1981* tape, issued in December 1983, provided data on homeowner properties from this component of the 1980 census (see printed report, series HC80-5, for details). It covered the United States, census regions, and two States—California and New York.

The multireel *County-to-County Migration Flows* files, released in the summer of 1984, were summary tapes, by State and the District of Columbia, of the data tabulated from the place-of-work and migration responses on the 1980 census household sample questionnaire, cross-tabulated by race, Spanish origin, and a number of sample characteristics, such as income. The tapes provided statistics about migration into and out of counties, as well as on intracounty movers and nonmovers. (The place-of-work and migration responses were coded for only about half of the sample cases nationally (see discussion

in chs. 5 and 6), while the other sample responses were fully coded. Accordingly, figures in this file could differ from those derived from the public-use microdata sample.)

A related file, *County Migration by Selected Characteristics, 1975-1980,* displayed on a 1-reel national tape sample gross out- and inmigration data for each county by age (18 5-year groups), modified race (total, White, Black), and sex. In-migrants were tabulated by country of birth, sex, and race (three categories) and detail was provided for persons in the Armed Forces and/or attending college, by group-quarters status. This file was released in the summer of 1985.

Another 1-reel file, *Number of Workers by County of Residence by County of Work,* identified the number of persons, by areas of residence and work, who were employed and at work during the census reference week. The tape covered all counties and county equivalents in the United States and Puerto Rico; it was released in early 1984. A similar tape, *Inter-County Migrant File,* was issued in January 1986; it provided a count of persons living in a specified county or county equivalent in the United States and the District of Columbia who were residents of a different county or county equivalent in 1975. Movers from abroad were not included.

To meet the requirements of Public Law 94-171, which directed the Census Bureau to provide each State, by April 1, 1981, population counts suitable for congressional redistricting and legislative reapportionment and redistricting, a separate tape was issued for each State and the District of Columbia. (See p. 29 for discussion.) This tape displayed a count of the total population down to the block level, and included election precincts in States or portions of States that participated with the Bureau in a voluntary delineation program. The tapes also contained provisional figures for five racial categories and for persons of Spanish/Hispanic origin.

This file was followed in the summer of 1981 by a 1-reel release, *Person and Housing Unit Counts for Tracts and Minor Civil Divisions.* Detail included total population, population in group quarters, total housing units, and occupied housing units.

Three files, issued in the winter of 1982-83 and the spring of 1983 dealt with county populations. *County Population by Age, Sex, Race, and Spanish Origin* (1 reel at 6,250 bpi or 4 reels at 1,600 bpi) covered all persons and housing units in the United States and contained a table for single years of age (up to 75+) for total, male, and female that was repeated for each 21 provisional race/Hispanic groups in the geographic area. *County Population by Age, Sex, Race, and Spanish Origin (Preliminary OMB-Consistent Modified Race)* was similar, except that the age tables were repeated for each of three race groups (White, Black, and Other) and two Spanish-origin groups (not Spanish, Spanish origin). *Group Quarters Population by Age, Sex, Race, and Spanish Origin* resembled those above, except that it was limited to persons living in group quarters.

As for 1970, the Census Bureau compiled a *Spanish Surname List* on tape (1 reel) for 1980 from approximately 85 million 1977 Federal tax returns. The 1980 file contained 12,497 surnames, condensed from 1.4 million and tabulated for 858 geographic areas, and was used in census processing.

Equal Employment Opportunity (EEO) Special Files for all persons in the civilian labor force were released in the fall of 1982 for the United States (1 reel per State) and in the following spring for Puerto Rico (1 reel). Tabulations were provided down to the level of places of 50,000 or more population. There were two tables—detailed occupation (514 categories) by sex, and school completed by age and sex. The U.S. tables were repeated by 12 groups that included total civilian labor force and various race classifications; the Puerto Rico tables excluded race. A U.S. summary, in computer-printout form on microfiche, was released for sale in the fall of 1983.

The data from several subject reports from the population census (see series PC80-2, described earlier in this chapter) were released on tape. These included PC80-6C, 6D, and 6E, *Journey to Work* (3 reels at 6,250 bpi or 7 reels at 1,600 bpi) in the fall of 1985, and 7C, *Occupation by Industry* (one file for the United States, regions, and divisions—1 reel at 6,250 bpi or 3 reels at 1,600 bpi—and another file for all States—2 reels at 6,250 bpi or 4 reels at 1,600 bpi) in the late summer of 1985. As it had after the 1970 census, the Bureau also produced in 1982 special tabulations called *Urban Transportation Planning Packages* (UTPP's). These UTPP's were tailored to geography specified by local planners and data on the characteristics of households, persons, and workers could be tabulated by areas as small as census tracts or block groups of residence and work. The Department of Transportation funded the overall development of the packages following discussions begun in 1978 between the Bureau and an ad hoc committee representing the Transportation Research Board. Final specifications were developed with the aid of professionals in various State and local agencies.

DATA DISSEMINATION

Scope

In the late 1960's, the Census Bureau increased attention to marketing its products, in the sense of heightening the awareness of data users outside the Federal Government to the range of products available. The primary role here was assigned to those units that became in 1971 what is now the Data User Services Division (DUSD). The Data Access and Use Laboratory produced technical documentation for the 1970 census summary tapes, organized tape users' conferences, gave official recognition to some 180 summary-tape processing centers, and generally provided data users with informational materials. The Census Use Study, concerned with research and new data applications, particularly among tape users, was phased out

during the 1970's. The Bureau's overall emphasis in that decade was on access to and use of existing data. In the 5 years through 1980, the division was expanded to include a User Training Branch, a Systems and Programming Staff, another staff to organize and service State data centers (see below), a Subscriber Services Section (transferred from the Administrative Services Division), and the National Services Program (transferred from the Decennial Census Division). The Data Access and Use Staff and the Customer Services Branch continued the division's original functions.

Aside from the 1980 census publication program described earlier, which included such items as DUSD's *Users' Guide*, information about the census results and their availability appeared in DUSD's annual *Catalog and Guide; Factfinder for the Nation* series of brochures; *Data Developments* (descriptions of tape and microform products); *Census '80: Continuing the Factfinder Tradition* and other materials for classroom use disseminated by the Training Branch's College Curriculum Support Project; monthly *Data User News* (subscription; name changed in 1988 to *Census and You*) and *Monthly Product Announcement* (free); and brochures such as "1980 Census and You" and "Neighborhood Statistics From the 1980 Census." (DUSD also produced statistical reports, such as the annual *Statistical Abstract of the United States* and its periodic supplements, the *County and City Data Book* and the *State and Metropolitan Area Data Book*, all of which contained and referenced 1980 census data.)

The Training Branch planned, developed, and coordinated the Bureau's user education and training program, which consisted of courses, seminars, workshops, and conferences, and produced the necessary instructional materials. Branch staff conducted several dozen courses each year for such data users as planners, librarians, teachers, reporters, and the like; in the 1980's, information specialists in the Bureau's regional offices took over many of the presentation functions as they scheduled workshops and other activities within their regions. The Training Branch also administered the Bureau's general exhibit program, designing and disseminating the necessary modules for the various conferences around the country at which the Bureau would be represented, especially those where census data users would be gathered in large numbers.

The National Services Program planned and conducted the Census Bureau's formal liaison with nationally based minority organizations, including national social service, business, professional, civil rights, educational, and religious groups. It conducted or coordinated briefings, workshops, and presentations to assist these organizations in obtaining and using data—primarily from the decennial census. In doing that, it promoted the sale and use of 1980 census reports, computer tapes, and other data products and services. The NSP also coordinated the Bureau's promotional activities with those of the various organizations with regard to the census.

The Bureau's regional user services program also was expanded. In 1977, each of the 12 regional offices began with one data user services specialist; by the mid-1980's, each had an information services coordinator, from two to four information services specialists, and one or two support-staff members. Thus, many of the training and contact functions DUSD had begun from Bureau headquarters were subsequently carried out at the regional level. The regional offices also kept copies of selected reports on file for customers' reference, as did the 47 Commerce Department field offices. All had publication order forms (POF's) for the various report series; POF's also were mailed to data users and potential users (their names and addresses were compiled on computer tape).

The Government Printing Office distributed selected reports to approximately 1,400 Government depository libraries, usually universities, in various parts of the country. The largest libraries received complete sets of publication series, while others were limited to those reports relevant to their region or State. The Census Bureau supplemented this distribution with copies for 134 census depository libraries—usually public libraries in smaller cities or isolated locales.

State Data Center (SDC) Program

The SDC program was a cooperative effort between the Census Bureau and the various States established in 1978 to make census information and data (here, primarily from the 1970 and 1980 censuses) available to the public through a network of State agencies, universities, libraries, and regional and local governments. The program objectives were to provide training and technical assistance in accessing and using these data for research, administration, planning, and decisionmaking by the government and business communities, university researchers, and other interested data users. In doing so, the SDC program would improve access to and extend the use of Census Bureau statistical resources and related products, including computerized data.

Agreements were made with the States of Alabama, Arizona, Louisiana, and North Carolina in 1978; 11 more States were added in 1979, 16 in 1980, 11 in 1981, 7 in 1982, 3 in 1983, and 1 (Wyoming) in 1986. Thus, all the States, plus the District of Columbia, Puerto Rico, Guam (1988), and the Virgin Islands, were involved, together with approximately 1,100 affiliates.

SDC organization varied from State to State, but usually involved a major State executive or planning agency, one or more major State universities, and the State Library. These units determined the exact structure of the individual State programs and served as the SDC's principal service, delivery, and coordinating units. In addition to this "umbrella" structure, each State developed a network of affiliate data centers, such as regional and local planning agencies, and public and university libraries, thus multiplying the effort to expand everyone's access and use of census data.

Each SDC provided staff and budget support for maintaining library facilities, with emphasis on reference materials and Census reports and maps, handled inquiries regarding Census

statistics, and offered user training such as workshops on accessing and using the data. They also offered data-processing services related to census data in machine-readable form, consulted on data use, assisted data users in various ways, and carried out promotional activities. The affiliates acted in their own areas much as their lead or coordinating agencies at the State level. This nationwide network responded to over a half million inquiries for census information each year beginning in 1985.

The Census Bureau, on its part, supported the SDC program through DUSD's State and Regional Programs Staff and the regional offices by supplying a full range of data products, including publications, computer tapes, software, maps, and microfiche at no cost. Usually these materials were for the particular State, but the State-level coordinating agencies received data for neighboring States as well. The Bureau also provided training and technical consultation and assistance.

Appendix 8A. 1980 Census of Population and Housing Publication Reports

Publication Schedule and Index to Detail on Selected Series

Series number	Report	Number of reports	Release dates	Detail, see page
PC80-1-A	Number Of Inhabitants	58	10/81-1/8340	41
PC80-1-B	General Population Characteristics	58	4/82-7/83	
PC80-1-C	General Social and Economic Characteristics	54	7/83-9/84	43
PC80-1-D	Detailed Population Statistics	54	10/83-1/85	
PC80-1-C/D	Detailed Population Statistics (Outlying Areas)	4	12/84-1/85	45
PC80-2	Subject Reports	40	6/84-2/88	46
PC80-S1	Supplementary Reports	21	5/81-3/86	47
HC80-1-A	General Housing Characteristics	58	6/82-8/83	48
HC80-1-B	Detailed Housing Characteristics	58	7/83-7/84	
HC80-2	Metropolitan Housing Characteristics	375	10/83-10/84	50
HC80-3	Subject Reports	5	10/84-9/85	59
HC80-4	Components of Inventory Change	2	10/83-1/84	59
HC80-5	Residential Finance	1	1/84	59
HC80-S1	Supplementary Reports	2	10/81-6/83	59
PHC80-1	Block Statistics	374	2/82-12/82	60
PHC80-2	Census Tracts	372	7/83-11/83	69
PHC80-3	Summary Characteristics of Governmental Units	52	10/82-12/82*	78
PHC80-4	Congressional Districts of the 98th Congress	51	3/83-5/83	80
PHC80-4	Congressional Districts of the 99th Congress	10	5/84-3/85	81
PHC80-4	Congressional Districts of the 100th Congress	1	5/86	81
PHC80-E	Population and Housing Evaluation Reports	4	8/85-	81
PHC80-P	Preliminary Population and Housing Unit Counts	56	11/80-1/81	82
PHC80-R	(General and reference reports)	5	1980-	–
No series	Census Tract Street Indexes	278	1980	–
No series	Congressional District Atlas	2	1983, 1985	–
PHC80-SP	Special Reports (Neighborhood Statistics)	1,292	1983-1984	–
PHC80-S	Supplementary Reports			–
	Provisional Estimates (1.6-percent subsample)	1	4/82	–
	Advance Estimates	51	9/82-4/83	–
PHC80-V	Final Population and Housing Unit Counts	56	3/81-4/81	84

– Not shown. * The Puerto Rico report was not issued until 6/83.

1980 Census of Population
Series PC80-1-A, -B Reports

Area	Report number	PC80-1-A, Number of Inhabitants			PC80-1-B, General Population Characteristics		
		Release date	Number of pages	Price (dollars)	Release date	Number of pages	Price (dollars)
U.S. Summary	1	6/83	289	6.00	7/83	363	6.50
Alabama	2	5/82	51	3.25	8/82	122	7.50
Alaska	3	12/81	39	3.00	9/82	112	5.50
Arizona	4	3/82	38	3.00	5/82	151	6.00
Arkansas	5	3/82	53	4.25	9/82	228	7.50
California	6	3/82	92	5.00	10/82	790	13.00
Colorado	7	12/81	45	3.00	6/82	217	7.00
Connecticut	8	1/82	44	3.00	6/82	248	7.50
Delaware	9	2/82	33	2.75	8/82	108	5.50
District of Columbia	10	3/82	33	2.75	9/82	88	5.50
Florida	11	3/82	73	4.75	9/82	283	11.00
Georgia	12	2/82	63	4.50	9/82	322	8.50
Hawaii	13	12/81	36	2.75	8/82	116	5.50
Idaho	14	6/82	38	3.25	6/82	136	6.00
Illinois	15	3/82	91	5.00	10/82	511	11.00
Indiana	16	3/82	66	4.50	10/82	340	9.00
Iowa	17	3/82	65	4.50	9/82	291	8.00
Kansas	18	1/82	62	4.50	7/82	250	7.50
Kentucky	19	3/82	55	4.25	10/82	292	8.50
Louisiana	20	3/82	48	3.25	7/82	237	7.50
Maine	21	6/82	45	3.00	8/82	171	6.50
Maryland	22	3/82	51	3.25	9/82	250	7.50
Massachusetts	23	1/82	52	4.25	8/82	339	9.00
Michigan	24	3/82	74	4.75	11/82	563	11.00
Minnesota	25	3/82	68	4.50	10/82	212	8.50
Mississippi	26	3/82	48	3.25	9/82	210	7.00
Missouri	27	3/82	70	4.75	10/82	316	8.50
Montana	28	10/81	38	3.00	4/82	135	6.00
Nebraska	29	1/82	53	4.25	8/82	218	7.00
Nevada	30	12/81	48	2.75	7/82	112	5.50
New Hampshire	31	12/81	42	3.00	6/82	161	6.50
New Jersey	32	3/82	68	4.50	10/82	487	11.00
New Mexico	33	2/82	38	3.00	7/82	152	6.50
New York	34	3/82	82	4.75	11/82	748	12.00
North Carolina	35	3/82	61	4.50	8/82	281	8.00
North Dakota	36	1/82	46	3.25	9/82	174	6.50
Ohio	37	3/82	77	4.75	11/82	472	11.00
Oklahoma	38	2/82	50	3.25	8/82	227	7.50
Oregon	39	1/82	46	3.25	10/82	196	7.00
Pennsylvania	40	3/82	91	5.00	11/82	719	12.00
Rhode Island	41	11/81	37	3.00	4/82	138	6.00

1980 Census of Population
Series PC80-1-A, -B Reports—Con.

Area	PC80-1-A, Number of Inhabitants				PC80-1-B, General Population Characteristics		
	Report number	Release date	Number of pages	Price (dollars)	Release date	Number of pages	Price (dollars)
South Carolina	42	1/82	48	3.25	9/82	206	7.00
South Dakota	43	2/82	47	3.25	9/82	167	6.50
Tennessee	44	3/82	55	4.25	9/82	268	8.00
Texas	45	4/82	108	5.50	11/82	814	13.00
Utah	46	2/82	40	3.00	7/82	147	5.50
Vermont	47	11/81	36	2.75	4/82	117	5.50
Virginia	48	3/82	59	4.50	10/82	351	9.00
Washington	49	3/82	52	3.25	11/82	264	7.50
West Virginia	50	3/82	44	3.00	9/82	184	7.00
Wisconsin	51	3/82	66	4.50	10/82	378	7.50
Wyoming	52	12/81	37	2.75	6/82	110	5.50
Puerto Rico							
(English and Spanish)	53A 53B	7/82 7.00	90	5.50	7/83	285	7.00
Virgin Islands of the U.S.	55	1/83	23	3.50	5/83	58	4.25
Guam	54	1/83	23	3.50	5/83	50	4.00
American Samoa	56	1/83	23	3.50	5/83	65	4.50
Northern Mariana Islands	57A	1/83	24	3.50	5/83	38	3.75
Trust Territory of the Pacific Islands (excluding the Northern Mariana Islands)	57B	1/83	49	4.75	6/83	124	5.00

1980 Census of Population
Series PC80-1-C, -D Reports

Area	Report number	PC80-1-C, General Social and Economic Characteristics: Release date	Number of pages	Price (dollars)	PC80-1-D, Detailed Characteristics: Release date	Number of pages	Price (dollars)
U.S. Summary	1	4/84	591	14.00	–	–	–
U.S. Summary, Section A	1	–	–	–	5/84	729	14.00
U.S. Summary, Section B	1	–	–	–	5/84	702	14.00
Regions 1 of 2	1	–	–	–	5/84	827	15.00
U.S. Summary, Section C	1	–	–	–	5/84	902	15.00
Alabama	2	8/83	596	5.50	12/83	1,083	11.00
Alaska	3	7/83	297	7.50	10/83	427	6.50
Arizona	4	8/83	350	4.50	12/84	867	11.00
Arkansas	5	8/83	534	5.00	1/84	721	14.00
California	6	9/83	Section 1, 722 Section 2,	8.00 per set	1/84	Section 1, 850 Section 2, 820 Section 3, 764 Section 4, 980	31.00 per set
Colorado	7	7/83	424	10.00	11/85	864	10.00
Connecticut	8	9/83	554	5.50	12/84	1,096	11.00
Delaware	9	9/83	277	4.25	1/84	573	13.00
District of Columbia	10	8/83	205	4.25	1/84	556	13.00
Florida	11	8/83	Section 1, 468 Section 2, 528	7.00 per set	12/83	Section 1, 696 Section 2, 733 Section 3, 796	19.00 per set
Georgia	12	8/83	892	6.00	1/83	1,072	19.00
Hawaii	13	7/83	271	7.00	11/83	661	8.50
Idaho	14	7/83	308	7.50	11/83	333	6.00
Illinois	15	10/83	Section 1, 488 Section 2, 445	7.00 per set	10/83	Section 1, 609 Section 2, 604	20.00 per set
Indiana	16	10/83	685	6.00	1/84	Section 1, 703 Section 2, 736	22.00 per set
Iowa	17	10/83	588	5.50	1/84	814	15.00
Kansas	18	8/83	514	5.50	11/83	768	9.00
Kentucky	19	9/83	669	5.50	1/84	Section 1, 600 Section 2, 516	18.00 per set
Louisiana	20	7/83	585	10.00	12/83	955	10.00
Maine	21	7/83	361	8.00	11/83	272	5.50
Maryland	22	9/83	600	5.50	2/84	1,014	18.00
Massachusetts	23	8/83	691	6.00	1/84	Section 1, 643 Section 2, 588	13.00 per set
Michigan	24	10/83	Section 1, 492 Section 2, 474	7.00 per set	1/84	Section 1, 872 Section 2, 806	22.00 per set
Minnesota	25	9/83	558	5.50	2/84	873	15.00
Mississippi	26	8/83	547	5.50	1/84	704	14.00

1980 Census of Population
Series PC80-1-C, -D Reports—Con.

Area	Report number	PC80-1-C, General Social and Economic Characteristics: Release date	Number of pages	Price (dollars)	PC80-1-D, Detailed Characteristics: Release date	Number of pages	Price (dollars)
Missouri	27	8/83	656	5.50	1/84	786	9.50
Montana	28	7/83	332	7.50	10/83	428	6.50
Nebraska	29	8/83	426	5.00	1/84	628	14.00
Nevada	30	7/83	272	4.25	12/83	639	8.50
New Hampshire	31	7/83	382	4.50	12/83	364	6.00
New Jersey	32	10/83	884	6.00	2/84	Section 1, 719 Section 2, 747 Section 3, 720	25.00 per set
New Mexico	33	7/83	336	7.50	1/84	625	8.50
New York	34	9/83	Section 1, 776 Section 2, 608	7.50 per set	1/84	Section 1, 985 Section 2, 950	24.00 per set
North Carolina	35	8/83	741	6.00	1/84	Section 1, 616 Section 2, 344	14.00 per set
North Dakota	36	9/83	332	4.50	1/84	272	6.50
Ohio	37	9/83	Section 1, 600 Section 2, 368	7.00 per set	2/84	Section 1, 1,049 Section 2, 1,044	24.00 per set
Oklahoma	38	8/83	539	5.50	12/83	880	15.00
Oregon	39	10/83	411	4.75	1/84	875	14.00
Pennsylvania	40	10/83	Section 1, 604 Section 2, 596	7.50 per set	2/84	Section 1, 984 Section 2, 962	24.00 per set
Rhode Island	41	7/83	342	4.50	2/84	542	8.00
South Carolina	42	8/83	525	5.50	1/84	Section 1, 556 Section 2, 525	19.00 per set
South Dakota	43	8/83	338	4.50	1/84	436	9.50
Tennessee	44	10/83	646	5.50	1/84	Section 1, 619 Section 2, 596	20.00 per set
Texas	45	9/83	Section 1, 744 Section 2, 768	8.00 per set	1/84	Section 1, 957 Section 2, 974	24.00 per set
Utah	46	7/83	313	7.50	11/83	465	6.50
Vermont	47	7/83	279	7.00	10/83	280	5.50
Virginia	48	9/83	831	6.00	1/84	Section 1, 644 Section 2, 696	20.00 per set
Washington	49	12/83	532	5.50	1/84	Section 1, 618 Section 2, 599	17.00 per set
West Virginia	50	10/83	431	4.75	1/84	652	14.00
Wisconsin	51	10/83	696	6.00	1/84	Section 1, 600 Section 2, 588	20.00 per set
Wyoming	52	7/83	262	6.50	10/83	269	5.50
Puerto Rico (English and Spanish)	53A 53B	3/84 7/84	293 332	6.50 9.50	9/84	512	16.00
Virgin Islands of the U.S.	55	9/84	152	5.50	1/85	176	5.50

– Means not applicable.

1980 Census of Population
Series PC80-1-C/D Reports

Area	PC80-1-C, General Social and Economic Characteristics and PC80-1-D, Detailed Characteristics (combined)			
	Report number	Release date	Number of pages	Price (dollars)
Guam	54	12/84	76	3.00
American Samoa	56	12/84	200	5.50
Northern Mariana Islands	57A	12/84	76	3.00
Trust Territory of the Pacific Islands (excluding the Northern Mariana Islands)	57B	1/85	320	9.00

1980 Census of Population
Series PC80-2, Subject Reports

Title	Report number	Release date	Number of pages	Price (dollars)
Black Population	1A	–	Cancelled	–
Persons of Spanish Origin or Surname	1B	–	Cancelled	–
American Indians, Eskimos, and Aleuts in the United States	1C	–	Cancelled	–
American Indians, Eskimos, and Aleuts: Reservations and Historic Areas of Oklahoma	1D	–	–	–
Part 1	–	12/85	192	7.00
Part 2, Section 1	–	3/86	648	23.00
Part 2, Section 2	–	3/86	612	22.00
Asian and Pacific Islander Population (modified version)	1E	–	–	–
Section 1 of 2	–	2/88	578	27.00
Section 2 of 2	–	2/88	434	21.00
Ancestry of the Population	1F	–	Cancelled	–
Persons Born in Foreign Countries	1G	–	Cancelled	–
Language Usage in the United States	1H	–	Cancelled	–
Geographic Mobility for States and the Nation	2A	10/85	924	25.00
Lifetime and Recent Migration	2B	–	Cancelled	–
Geographical Mobility for Metropolitan Areas	2C	12/84	772	14.00
Fertility	3A	–	Cancelled	–
Household and Family Composition	4A	–	Cancelled	–
Living Arrangements of Children and Adults	4B	6/85	152	5.50
Marital Characteristics	4C	4/85	368	13.00
Persons in Institutions and Other Group Quarters	4D	12/84	912	15.00
Education	5A	–	Cancelled	–
Labor Force Status and Work Experience	6A	–	Cancelled	–
Persons Not Employed	6B	–	Cancelled	–
Journey to Work: Metropolitan Commuting Flows	6C	6/84	595	14.00
Journey to Work: Characteristics of Workers in Metropolitan Areas	6D	–	–	–
Section 1 of 3	–	11/84	1,188	28.00
Section 2 of 3	–	11/84	964	22.00
Section 3 of 3	–	11/84	912	22.00
Place of Work	6E	7/84	1,039	19.00
Occupational Characteristics	7A	–	Cancelled	–
Industrial Characteristics	7B	–	Cancelled	–
Occupation by Industry	7C	7/84	711	14.00
Government Workers	7D	–	Cancelled	–
Sources and Structure of Household and Family Income	8A	–	Cancelled	–
Earnings by Occupation and Education	8B	6/84	540	13.00
Characteristics of the Poverty Population	8C	–	Cancelled	–
Poverty Areas in Large Cities	8D	4/85	748	14.00
Characteristics of Metropolitan-Nonmetropolitan Population	9A	–	Cancelled	–
Persons by Census Tract Characteristics	9B	–	Cancelled	–
Characteristics of the Rural and Farm-Related Population	9C	8/85	244	8.50
Older Population	9D	–	Cancelled	–
Women	9E	–	Cancelled	–
Veterans	9F	–	Cancelled	–

– Means not applicable.

1980 Census of Population
Series PC80-S1, Supplementary Reports

Title	Report number	Release date	Number of pages	Price (dollars)
Age, Sex, Race, and Spanish Origin of the Population by Regions, Divisions, and States: 1980	S1-1	5/81	6	2.00
Population and Households by States and Counties: 1980	S1-2	1981	23	3.25
Race of the Population by States: 1980	S1-3	1981	14	2.00
Population and Households for Census Designated Places: 1980	S1-4	1981	42	3.25
Standard Metropolitan Statistical Areas and Standard Consolidated Statistical Areas: 1980	S1-5	1981	68	4.75
Nonpermanent Residents by States and Selected Counties and Incorporated Places: 1980	S1-6	1982	29	3.50
Persons of Spanish Origin by State: 1980	S1-7	1982	20	3.25
Detailed Occupation and Years of School Completed by Age, for the Civilian Labor Force by Sex, Race, and Spanish Origin: 1980	S1-8	4/83	33	4.50
State of Residence in 1975 by State of Residence in 1980	S1-9	3/83	10	2.25
Ancestry of the Population by State: 1980	S1-10	6/83	87	4.50
Congressional District Profiles, 98th Congress	S1-11	11/83	57	3.50
Asian and Pacific Islander Population by State: 1980	S1-12	1/84	26	1.50
American Indian Areas and Alaska Native Villages: 1980	S1-13	9/84	44	2.75
Population and Land Area of Urbanized Areas for the United States and Puerto Rico: 1980 and 1970	S1-14	4/84	478	12.00
Detailed Occupation of the Experienced Civilian Labor Force by Sex for the United States and Regions: 1980 and 1970	S1-15	4/84	53	2.25
Residence in 1975 for States by Age, Sex, Race, and Spanish Origin: 1980	S1-16	4/84	342	9.50
Gross Migration for Counties: 1975 to 1980	S1-17	4/84	248	7.00
Metropolitan Statistical Areas (as defined by the Office of Management and Budget in 1963)	S1-18	2/85	188	5.50
Rural and Farm Population by Current (1980) and Previous (1970 Farm Definitions, for States and Counties: 1980	S1-19	5/85	24	1.00
Selected Characteristics of Persons With a Work Disability by State: 1980	S1-20	12/85	140	5.00
Summary Characteristics of the Black Population for States and Selected Counties and Places: 1980	S1-21	3/86	80	4.00

1980 Census of Housing
Series HC80-1-A, -B Reports

Area	Report number	HC80-1-A, General Housing Characteristics			HC80-1-B, Detailed Housing Characteristics		
		Release date	Number of pages	Price (dollars)	Release date	Number of Pages	Price (dollars)
U.S. Summary	1	9/83	287	6.50	4/84	353	8.50
Alabama	2	8/82	224	7.50	7/83	240	4.25
Alaska	3	8/82	112	5.50	7/83	129	3.75
Arizona	4	6/82	156	6.50	7/83	145	3.75
Arkansas	5	9/82	231	7.50	8/83	216	4.25
California	6	8/83	814	13.00	8/83	561	5.50
Colorado	7	6/82	216	7.00	7/83	180	6.00
Connecticut	8	7/82	233	7.50	8/83	227	4.25
Delaware	9	8/82	113	5.50	8/83	119	3.75
District of Columbia	10	9/82	90	5.50	8/83	101	3.75
Florida	11	11/82	501	11.00	9/83	406	4.75
Georgia	12	9/82	331	9.00	7/83	358	4.50
Hawaii	13	8/82	118	5.50	7/83	121	5.00
Idaho	14	6/82	130	6.00	7/83	139	5.50
Illinois	15	11/82	501	11.00	9/83	390	4.75
Indiana	16	9/82	339	9.00	9/83	271	4.25
Iowa	17	10/82	281	8.00	8/83	232	4.25
Kansas	18	8/82	242	7.50	7/83	207	4.25
Kentucky	19	9/82	299	8.50	8/83	274	4.25
Louisiana	20	6/83	245	7.50	7/83	246	6.50
Maine	21	4/82	159	6.50	7/83	154	5.50
Maryland	22	11/82	266	7.50	8/83	237	4.25
Massachusetts	23	8/82	299	8.50	7/83	269	7.00
Michigan	24	10/82	524	11.00	9/83	397	5.25
Minnesota	25	9/82	289	8.00	8/83	237	4.25
Mississippi	26	8/82	221	7.50	8/83	227	4.25
Missouri	27	9/82	310	8.50	8/83	262	4.25
Montana	28	6/82	132	6.00	8/83	145	4.00
Nebraska	29	9/82	221	7.50	8/83	187	4.00
Nevada	30	7/82	115	5.50	7/83	121	3.75
New Hampshire	31	9/82	154	6.50	7/83	150	3.75
New Jersey	32	11/82	480	11.00	8/83	342	5.00
New Mexico	33	8/82	160	6.50	7/83	147	3.75
New York	34	11/82	672	12.00	8/83	482	5.50
North Carolina	35	9/82	275	8.00	7/83	296	7.50
North Dakota	36	9/82	172	6.50	8/83	154	3.75
Ohio	37	10/82	456	11.00	9/83	377	4.50
Oklahoma	38	8/82	216	7.00	7/83	222	4.25
Oregon	39	10/82	189	7.00	9/83	169	4.00
Pennsylvania	40	11/82	636	12.00	8/83	472	5.25
Rhode Island	41	6/82	139	6.00	6/83	152	5.50

1980 Census of Housing

Series HC80-1-A, -B Reports—Con.

Area	Report number	HC80-1-A, General Housing Characteristics			HC80-1-B, Detailed Housing Characteristics		
		Release date	Number of pages	Price (dollars)	Release date	Number of Pages	Price (dollars)
South Carolina	42	10/82	214	7.00	7/83	214	4.25
South Dakota	43	9/82	169	6.50	8/83	149	3.75
Tennessee	44	9/82	278	8.00	9/83	253	4.25
Texas	45	11/82	870	14.00	8/83	609	5.50
Utah	46	8/82	141	6.00	8/83	134	3.75
Vermont	47	6/82	119	5.50	7/83	136	3.75
Virginia	48	10/82	364	9.00	8/83	336	4.50
Washington	49	10/82	257	7.50	9/83	217	4.25
West Virginia	50	9/82	188	7.00	9/83	187	4.25
Wisconsin	51	8/82	365	9.00	9/83	283	4.25
Wyoming	52	7/82	112	5.50	7/83	115	5.00
Puerto Rico							
(English and	53A	8/83	138	7.50	3/84	126	4.00
Spanish)	53B	3/84	116	7.50	7/84	136	4.75
Guam	54	6/83	52	4.00	7/84	56	2.25
Virgin Islands of the U.S.	55	6/83	74	4.50	4/84	66	2.75
American Samoa	56	6/83	73	4.50	7/84	76	3.00
Northern Mariana Islands	57A	6/83	38	3.75	6/84	36	2.25
Trust Territory of the Pacific Islands (excluding the Northern Mariana Islands)	57B	6/83	136	5.00	7/84	140	5.00

1980 Census of Housing

Series HC80-2, Metropolitan Housing Characteristics

Area	Report number	Release date	Number of pages	Price (dollars)
United States Summary	1	6/84	1,061	18.00
Alabama	2	1/84	184	4.50
Alaska	3	1/84	128	4.00
Arizona	4	2/84	260	6.50
Arkansas	5	1/84	176	4.25
California	6	2/84	256	6.00
Colorado	7	11/83	252	6.50
Connecticut	8	12/83	220	6.00
Delaware	9	1/84	156	4.25
District of Columbia	10	(see 365)	–	–
Florida	11	1/84	244	6.00
Georgia	12	1/84	211	6.00
Hawaii	13	11/83	216	6.00
Idaho	14	12/83	128	5.00
Illinois	15	1/84	252	6.00
Indiana	16	1/84	211	6.00
Iowa	17	1/84	208	6.00
Kansas	18	1/84	220	6.00
Kentucky	19	1/84	184	4.25
Louisiana	20	12/83	240	6.50
Maine	21	11/83	96	4.50
Maryland	22	1/84	128	6.00
Massachusetts	23	12/83	228	6.50
Michigan	24	2/84	244	6.00
Minnesota	25	10/83	252	6.00
Mississippi	26	12/83	176	5.50
Missouri	27	12/83	228	6.50
Montana	28	11/83	120	5.00
Nebraska	29	1/84	196	4.50
Nevada	30	11/83	228	6.50
New Hampshire	31	11/83	96	4.50
New Jersey	32	1/84	220	6.00
New Mexico	33	2/84	196	6.00
New York	34	1/84	250	4.25
North Carolina	35	2/84	233	6.00
North Dakota	36	1/84	120	3.75
Ohio	37	2/84	244	6.00
Oklahoma	38	1/84	252	6.00
Oregon	39	2/84	244	6.00
Pennsylvania	40	1/84	222	6.00
Rhode Island	41	11/83	196	6.00
South Carolina	42	2/84	187	4.50
South Dakota	43	2/84	112	3.75
Tennessee	44	12/83	220	6.00
Texas	45	2/84	255	6.00
Utah	46	11/83	184	6.00

1980 Census of Housing

Series HC80-2, Metropolitan Housing Characteristics—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Vermont	47	11/83	96	4.50
Virginia	48	11/83	228	6.50
Washington	49	2/84	201	6.00
West Virginia	50	1/84	176	4.00
Wisconsin	51	1/84	240	6.00
Wyoming	52	11/83	108	4.75
Puerto Rico				
(English and	53A	8/84	116	4.50
Spanish)	53B	10/84	116	4.50
Guam—Not published	54	–	–	–
Virgin Islands of the U.S.—Not published	55	–	–	–
American Samoa—Not published	56	–	–	–
Trust Territory of the Pacific Islands (excluding the Northern Mariana Islands)—Not published	57	–	–	–
Abilene, TX	58	2/84	100	3.75
Akron, OH	59	1/84	120	4.00
Albany, GA	60	1/84	128	4.00
Albany-Schenectady-Troy, NY	61	1/84	144	4.00
Albuquerque, NM	62	11/83	134	5.50
Alexandria, LA	63	11/83	128	5.00
Allentown-Bethlehem-Easton, Pa-NJ	64	12/83	120	5.00
Altoona, PA	65	1/84	78	2.50
Amarillo, TX	66	1/84	108	3.75
Anaheim-Santa Ana-Garden Grove, CA	67	1/84	404	9.00
Anchorage, AL	68	12/83	84	4.50
Anderson, IN	69	1/84	100	3.75
Anderson, SC	70	1/84	128	4.00
Ann Arbor, MI	71	1/84	128	4.00
Anniston, AL	72	1/84	122	4.00
Appleton-Oshkosh, WI	73	1/84	90	2.50
Arecibo, PR-A (English)	74A	8/84	92	3.25
Arecibo, PR-B (Spanish)	74B	8/84	94	3.25
Asheville, NC	75	1/84	128	5.00
Athens, GA	76	1/84	128	4.00
Atlanta, GA	77	1/84	144	4.00
Atlantic City, NJ	78	12/83	128	5.00
Augusta, GA-SC	79	2/84	156	4.25
Austin, TX	80	2/84	144	4.00
Bakersfield, CA	81	1/84	144	4.00
Baltimore, MD	82	1/84	208	6.00
Bangor, ME	83	11/83	84	4.50
Baton Rouge, LA	84	11/83	128	5.00
Battle Creek, MI	85	1/84	122	4.00
Bay City, MI	86	1/84	84	2.50

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Series HC80-2, Metropolitan Housing Characteristics—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Beaumont-Port Arthur-Orange, TX	87	1/84	108	6.00
Bellingham, WA	88	1/84	78	2.50
Benton Harbor, MI	89	4/84	122	4.00
Billings, MT	90	12/83	84	4.50
Biloxi-Gulfport, MS	91	12/83	164	5.50
Binghamton, NY-PA	92	10/83	84	2.50
Birmingham, AL	93	1/84	128	4.00
Bismarck, ND	94	1/84	78	2.50
Bloomington, IN	95	1/84	78	2.50
Bloomington-Normal, IL	96	1/84	96	2.50
Boise City, ID	97	11/83	84	4.50
Boston, MA	98	12/83	282	7.00
Bradenton, FL	99	1/84	122	4.00
Bremerton, WA	100	1/84	84	2.50
Bridgeport, CT	101	12/83	152	5.50
Bristol, CT	102	11/83	84	4.50
Brockton, MA	103	11/83	84	4.50
Brownsville-Harlingen- San Benito, TX	104	1/84	146	4.00
Bryan-College Station, TX	105	1/84	164	4.25
Buffalo, NY	106	1/84	191	4.75
Burlington, NC	107	12/83	128	5.50
Burlington, VT	108	1/84	78	4.50
Caguas, PR (English)	109A	8/84	92	3.25
Caguas, PR (Spanish)	109B	9/84	92	3.25
Canton, OH	110	1/84	122	4.00
Casper, WY	111	11/83	84	4.50
Cedar Rapids, IA	112	1/84	84	2.50
Champaign-Urbana-Rantoul, IL	113	1/84	166	4.25
Charleston, N. Charleston, SC	114	1/84	164	4.25
Charleston, WV	115	1/84	128	4.00
Charlotte-Gastonia, NC	116	12/83	184	5.50
Charlottesville, VA	117	1/84	122	4.00
Chattanooga, TN-GA	118	10/83	128	3.75
Chicago, IL	119	2/84	464	9.50
Chico, CA	120	1/84	84	2.50
Cincinnati, OH-KY, IN	121	1/84	122	4.00
Clarksville-Hopkinsville, TN-KY	122	1/84	156	4.25
Cleveland, OH	123	1/84	225	6.00
Colorado Springs, CO	124	11/83	152	5.50
Columbia, MO	125	12/83	84	4.50
Columbia, SC	126	1/84	122	4.00
Columbus, GA-AL	127	2/84	122	4.00
Corpus Christi, TX	129	1/84	144	4.00
Cumberland, MD-VA	130	1/84	84	4.50
Dallas-Ft. Worth, TX	131	1/84	308	7.50

1980 Census of Housing

Series HC80-2, Metropolitan Housing Characteristics—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Danbury, CT	132	11/83	79	4.50
Danville, VA	133	1/84	128	4.00
Davenport-Rock Island-Moline, IA	134	1/84	134	4.25
Dayton, OH	135	2/84	134	4.00
Daytona Beach, FL	136	1/84	128	4.00
Decatur, IL	137	1/84	122	4.00
Denver-Boulder, CO	138	11/83	256	6.50
Des Moines, IA	139	1/84	112	4.00
Detroit, MI	140	2/84	368	7.50
Dubuque, IA	141	1/84	84	2.50
Duluth-Superior, MN-WI	142	1/84	96	2.50
Eau Claire, WI	143	1/84	76	2.50
El Paso, TX	144	1/84	152	4.00
Elkhart, IN	145	1/84	108	3.75
Elmira, NY	146	10/83	84	2.50
Enid, OK	147	1/84	78	2.50
Erie, PA	148	1/84	128	4.00
Euguene-Springfield, OR	149	1/84	80	2.50
Evansville, IN-KY	150	1/84	128	4.00
Fall River, MA-RI	151	11/83	84	4.50
Fargo-Moorhead, ND-MN	152	1/84	96	2.50
Fayetteville, NC	153	12/83	128	5.00
Fayetteville-Springdale, AR	154	12/83	96	4.50
Fitchburg-Leominster, MA	155	11/83	95	4.50
Flint, MI	156	1/84	122	4.00
Florence, AL	157	1/84	128	4.00
Florence, SC	158	1/84	122	4.00
Ft. Collins, CO	159	11/83	84	4.50
Ft. Lauderdale-Hollywood, FL	160	1/84	188	4.50
Ft. Myers-Cape Coral, FL	161	1/84	140	4.00
Ft. Smith, AR-OK	162	1/84	84	2.50
Ft. Walton Beach, FL	163	1/84	108	3.75
Ft. Wayne, IN	164	1/84	128	4.00
Fresno, CA	165	1/84	155	4.00
Gadsden, AL	166	1/84	122	4.00
Gainesville, FL	167	2/84	122	4.00
Galveston-Texas City, TX	168	1/84	189	4.75
Gary-Hammond-E. Chicago, IN	169	1/84	208	6.00
Glens Falls, NY	170	1/84	78	2.50
Grand Forks, ND-MN	171	1/84	84	2.50
Grand Rapids, MI	172	1/84	152	4.00
Great Falls, MT	173	11/83	84	4.50
Greeley, CO	174	11/83	108	4.75
Green Bay, WI	175	1/84	84	2.50
Greensboro–Winston-Salem–High Point, NC	176	12/83	196	6.00

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Series HC80-2, Metropolitan Housing Characteristics—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Greenville-Spartanburg, SC	177	1/84	156	4.25
Hagerstown, MD	178	12/83	84	4.50
Hamilton-Middletown, OH	179	1/84	140	4.00
Harrisburg, PA	180	1/84	122	4.00
Hartford, CT	181	11/83	152	5.50
Hickory, NC	182	2/84	128	4.00
Honolulu, HI	183	11/83	120	5.50
Houston, TX	184	1/84	212	4.00
Huntington-Ashland, WV-KY-OH	185	1/84	90	2.50
Huntsville, AL	186	1/84	128	4.00
Indianapolis, IN	187	1/84	128	4.00
Iowa City, IA	188	1/84	78	2.50
Jackson, MI	189	1/84	122	4.00
Jackson, MS	190	12/83	128	5.00
Jacksonville, FL	191	1/84	133	4.00
Jacksonville, NC	192	1/84	128	4.00
Janesville-Beloit, WI	193	1/84	110	3.75
Jersey City, NJ	194	1/84	190	4.50
Johnson City-Kingsport-Bristol, TN-VA	195	1/84	108	4.75
Johnstown, PA	196	12/83	84	4.50
Joplin, MO	197	12/83	84	5.50
Kalamazoo-Portage, MI	198	1/84	140	4.00
Kankakee, IL	199	1/84	122	4.00
Kansas City, MO-KS	200	11/83	208	6.00
Kenosha, WI	201	1/84	78	2.50
Killeen-Temple, TX	202	1/84	196	4.75
Knoxville, TN	203	1/84	128	4.00
Kokomo, IN	204	1/84	84	2.50
La Crosse, WI	205	1/84	84	2.50
Lafayette, LA	206	12/83	128	5.00
Lafayette-W. Lafayette, IN	207	1/84	90	2.50
Lake Charles, LA	208	12/83	128	5.00
Lakeland-Winter Haven, FL	209	2/84	164	4.25
Lancaster, PA	210	1/84	79	4.50
Lansing-E. Lansing, MI	211	1/84	152	4.00
Laredo, TX	212	1/84	108	3.75
Las Cruces, NM	213	12/83	108	4.75
Las Vegas, NV	214	11/83	164	5.50
Lawrence, KS	215	1/84	78	2.50
Lawrence-Haverhill, MA-NH	216	12/83	120	5.00
Lawton, OK	217	1/84	112	4.00
Lewiston-Auburn, ME	218	11/83	96	4.50
Lexington-Fayette, KY	219	1/84	128	4.00
Lima, OH	220	1/84	122	4.00
Lincoln, NE	221	1/84	84	4.50

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Area	Report number	Release date	Number of pages	Price (dollars)
Little Rock-N. Little Rock, AR	222	1/84	164	4.25
Long Branch-Asbury Park, NJ	223	1/84	188	4.50
Longview-Marshall, TX	224	1/84	164	4.25
Lorain-Elyria, OH	225	1/84	184	4.50
Los Angeles-Long Beach, CA		1/84		
Section 1 of 2	226	1/84	548	18.00 per set
Section 2 of 2		1/84	560	
Louisville, KY-IN	227	1/84	128	4.00
Lowell, MA-NH	228	11/83	84	4.50
Lubbock, TX	229	2/84	122	4.00
Lynchburg, VA	230	1/84	128	5.00
Macon, GA	231	1/84	122	4.00
Madison, WI	232	1/84	84	2.50
Manchester, NH	233	12/83	84	4.50
Mansfield, OH	234	1/84	91	3.75
Mayaguez, PR-A (English)	235A	8/84	92	3.25
Mayaquez, PR-B (Spanish)	235B	9/84	92	3.25
McAllen-Pharr-Edinburg, TX	236	1/84	152	4.00
Medford, OR	237	1/84	84	2.50
Melbourne-Titusville-Cocoa, FL	238	1/84	196	4.75
Memphis, TN-AR-MS	239	12/83	128	5.00
Meriden, CT	240	12/83	84	4.50
Miami, FL	241	1/84	224	6.00
Midland, TX	242	1/84	108	3.75
Milwaukee, WI	243	2/84	180	4.50
Minneapolis-St. Paul, MN-WI	244	1/84	201	6.00
Mobil, AL	245	1/84	112	4.00
Modesto, CA	246	1/84	108	3.75
Monroe, LA	247	12/83	128	5.00
Montgomery, AL	248	1/84	128	4.00
Muncie, IN	249	1/84	78	2.50
Muskegon-Norton Shores Muskegon Hts., MI	250	2/84	166	4.25
Nashua, NH	251	11/83	79	4.50
Nashville-Davidson, TN	252	12/83	128	5.00
Nassau-Suffolk, NY	253	1/84	122	4.00
New Bedford, MA	254	11/83	84	4.50
New Britain, CT	255	12/83	84	6.00
New Brunswick, Perth Amboy-Sayreville, NJ	256	1/84	180	4.50
New Haven, W. Haven, CT	257	11/83	164	5.50
New London-Norwich, CT-RI	258	12/83	120	5.00
New Orleans, LA	259	12/83	208	6.00
New York, NY	260	1/84	297	7.50
Newark, NJ	261	1/84	276	6.00
Newark, OH	262	1/84	84	2.50
Newburgh-Middletown, NY	263	1/84	156	4.25
Newport News-Hampton, VA	264	12/83	164	5.50

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Series HC80-2, Metropolitan Housing Characteristics—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Norfolk Virginia Beach-Portsmouth, VA-NC	265	1/84	252	6.50
Northeast, PA	266	1/84	108	4.75
Norwalk, CT	267	11/83	128	5.00
Ocala, FL	268	1/84	128	4.00
Odessa, TX	269	1/84	108	3.75
Oklahoma City, OK	270	1/84	178	4.50
Olympia, WA	271	1/84	84	2.50
Omaha, NE-IA	272	12/83	152	5.50
Orlando, FL	273	1/84	140	4.50
Owensboro, KY	274	1/84	78	2.50
Oxnard-Simi Valley-Ventura, CA	275	1/84	188	4.50
Panama City, FL	276	1/84	122	4.00
Parkersburg-Marietta, WV-OH	277	1/84	88	2.50
Pascagoula-Moss Point, MS	278	12/83	164	5.50
Paterson-Clifton-Passaic, NJ	279	1/84	208	6.00
Pensacola, FL	280	1/84	128	4.00
Peoria, IL	281	1/84	128	4.00
Petersburg-Colonial Hts.-Hopewell, VA	282	1/84	176	5.50
Philadelphia, PA-NJ	283	10/83	220	6.00
Phoenix, AZ	284	1/84	256	6.00
Pine Bluff, AR	285	12/83	128	5.00
Pittsburgh, PA	286	1/84	133	5.50
Pittsfield, MA	287	12/83	84	4.50
Ponce, PR-A (English)	288A	8/84	92	3.25
Ponce, PR-B (Spanish)	288B	9/84	92	3.25
Portland, ME	289	11/83	84	4.50
Portland, OR-WA	290	2/84	155	4.25
Portsmouth-Dover-Rochester, NH-ME	291	12/83	108	4.75
Poughskeepsie, NY	292	1/84	128	4.00
Providence-Warwick-Pawtucket, RI	293	12/83	188	6.00
Provo-Orem, UT	294	11/83	96	4.50
Pueblo, CO	295	11/83	101	4.75
Racine, WI	296	1/84	128	4.00
Raleigh-Durham, NC	297	11/83	164	5.50
Reading, PA	298	12/83	84	2.50
Redding, CA	299	1/84	84	2.50
Reno, NV	300	11/83	84	4.50
Richland-Kennewick-Pasco, WA	301	1/84	124	4.00
Richmond, VA	302	12/83	128	5.00
Riverside-San Bernardino-Ontario, CA	303	1/84	264	6.00
Roanoke, VA	304	1/84	112	5.00
Rochester, MN	305	1/84	84	2.50
Rochester, NY	306	1/84	144	4.00
Rockford, IL	307	1/84	128	4.00
Rock Hill, SC	308	1/84	128	4.00

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Area	Report number	Release date	Number of pages	Price (dollars)
Sacramento, CA	309	1/84	202	6.00
Saginaw, MI	310	1/84	140	4.00
St. Cloud, MN	311	1/84	84	2.50
St. Joseph, MO	312	1/84	84	3.75
St. Louis, MO-IL	313	12/83	196	6.00
Salem, OR	314	1/84	96	2.50
Salinas-Seaside-Monterey, CA	315	1/84	190	4.75
Salisbury-Concord, NC	316	10/83	164	5.50
Salt Lake City-Ogden, UT	317	11/83	164	5.50
San Angelo, TX	318	1/84	100	3.75
San Antonio, TX	319	1/84	152	4.00
San Diego, CA	320	2/84	268	6.00
San Francisco-Oakland, CA	321	2/84	531	12.00
San Jose, CA	322	1/84	292	7.50
San Juan, PR-(English)	323A	8/84	154	5.50
San Juan, PR-(Spanish)	323B	9/84	146	5.50
Santa Barbara-Santa Maria-Lompoc, CA	324	1/84	152	4.00
Santa Cruz, CA	325	1/84	79	2.50
Santa Rosa, CA	326	1/84	88	2.50
Sarasota, FL	327	2/84	122	4.00
Savannah, GA	328	1/84	122	4.00
Seattle-Everett, WA	329	1/84	201	6.00
Sharon, PA	330	1/84	84	2.50
Sheboygan, WI	331	1/84	84	2.50
Sherman-Denison, TX	332	2/84	134	4.00
Shreveport, LA	333	11/83	164	5.50
Sioux City, IA-NE	334	12/83	84	4.50
Sioux Falls, SD	335	2/84	84	2.50
South Bend, IN	336	1/84	112	4.00
Spokane, WA	337	1/84	84	2.50
Springfield, IL	338	1/84	128	4.00
Springfield, MO	339	12/83	84	4.50
Springfield, OH	340	1/84	128	4.00
Springfield-Chicopee-Holyoke, MA-CT	341	11/83	138	6.00
Stamford, CT	342	11/83	128	6.50
State College, PA	343	12/83	84	4.50
Steubenville-Weirton, OH-WV	344	1/84	112	3.75
Stockton, CA	345	1/84	166	4.25
Syracuse, NY	346	1/84	128	4.00
Tacoma, WA	347	2/84	154	4.00
Tallahassee, FL	348	1/84	128	4.00
Tampa-St. Petersburg, FL	349	1/84	302	4.50
Terre Haute, IN	350	1/84	84	2.50
Texarkana, TX-Texarkana, AR	351	1/84	146	4.25
Toledo, OH-MI	352	2/84	152	4.00

1980 Census of Housing

Series HC80-2, Metropolitan Housing Characteristics--Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Topeka, KS	353	1/84	112	4.00
Trenton, NJ	354	12/83	140	5.50
Tucson, AZ	355	11/83	164	5.50
Tulsa, OK	356	2/84	144	4.00
Tuscaloosa, AL	357	1/84	128	4.00
Tyler, TX	358	1/84	128	4.00
Utica-Rome, NY	359	1/84	96	2.50
Vallejo-Fairfield-Napa, CA	360	2/84	201	6.00
Victoria, TX	361	1/84	98	3.75
Vineland-Millville, Bridgeton, NJ	362	1/84	176	4.25
Visalia-Tulare, Porterville, CA	363	1/84	152	4.00
Waco, TX	364	2/84	142	4.00
Washington, DC-MD-VA	365	1/84	259	6.00
Waterbury, CT	366	12/83	128	5.00
Waterloo-Cedar Falls, IA	367	1/84	112	3.75
Wausau, WI	368	1/84	67	2.50
West Palm Beach-Boca Raton, Fl	369	1/84	145	4.00
Wheeling, WV-OH	370	1/84	84	2.50
Wichita, KS	371	11/83	140	5.50
Wichita Falls, TX	372	2/84	122	4.00
Williamsport, PA	373	2/84	84	4.50
Wilmington, DE-NJ-MD	374	12/83	128	5.00
Wilmington, NC	375	11/83	128	5.00
Worcester, MA	376	12/83	84	4.50
Yakima, WA	377	1/84	96	2.50
York, PA	378	12/83	108	4.75
Youngstown-Warren, OH	379	1/84	155	4.25
Yuba City, CA	380	1/84	96	2.50

– Means not applicable.

1980 Census of Housing
Series HC80-3, Subject Reports

Title	Report number	Release date	Number of pages	Price (dollars)
Housing of Older Population	H1	–	Cancelled	–
Mobile Homes	H2	11/84	636	13.00
Condominium Housing	H3	6/85	340	12.00
Structural Characteristics of the Housing Inventory	H4	10/84	672	14.00
Space Utilization of Inventory	H5	7/85	600	22.00
Mover Households	H6	9/85	552	20.00

– Means not applicable.

1980 Census of Housing
Series HC80-4, Components of Inventory Change

Title	Report number	Release date	Number of pages	Price (dollars)
Components of Inventory Change, United States and Regions	I	10/12/83	689	8.50
SMSA Groupings With Populations of One Million or More in 1970	IIA	1/18/84	528	15.00
SMSA Groupings With Populations of Less Than One Million in 1970	IIB	1/31/84	528	14.00

1980 Census of Housing
Series HC80-5, Residential Finance

Title	Report number	Release date	Number of pages	Price (dollars)
Residential Finance	HC80-5	1/84	876	16.00

1980 Census of Housing
Series HC80-S1, Supplementary Reports

Title	Report number	Release date	Number of pages	Price (dollars)
Selected Housing Characteristics by States and Counties: 1980	S1-1	10/81	36	2.75
Components of Inventory Change Survey	S1-2	6/83	4	1.50

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1980 Census of Population and Housing

Series PHC80-1, Block Statistics

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Area	Report number	Release date	Number of pages
U.S. Summary	1	3/83	511*
Alabama	2	6/82	139
Alaska	3	2/82	38
Arizona	4	6/82	71
Arkansas	5	5/82	137
California	6	7/82	90
Colorado	7	3/82	128
Connecticut	8	5/82	51
Delaware	9	6/82	34
District of Columbia	10	(see 365)	–
Florida	11	7/82	98
Georgia	12	9/82	882
Hawaii	13	3/82	28
Idaho	14	3/82	84
Illinois	15	9/82	229
Indiana	16	6/82	161
Iowa	17	5/82	159
Kansas	18	7/82	189
Kentucky	19	6/82	82
Louisiana	20	4/82	119
Maine	21	11/82	41
Maryland	22	6/82	43
Massachusetts	23	4/82	86
Michigan	24	9/82	104
Minnesota	25	7/82	118
Mississippi	26	7/82	594
Missouri	27	8/82	123
Montana	28	2/82	134
Nebraska	29	7/82	109
Nevada	30	3/82	32
New Hampshire	31	3/82	50
New Jersey	32	7/82	112
New Mexico	33	4/82	139
New York	34	9/82	559
North Carolina	35	7/82	189
North Dakota	36	3/82	68
Ohio	37	9/82	196
Oklahoma	38	5/82	152
Oregon	39	3/82	114
Pennsylvania	40	9/82	227
Rhode Island	41	4/82	40
South Carolina	42	5/82	82
South Dakota	43	4/82	96
Tennessee	44	6/82	137
Texas	45	7/82	301
Utah	46	5/82	78

1980 Census of Population and Housing

Series PHC80-1, Block Statistics—Con.

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Area	Report number	Release date	Number of pages
Vermont	47	2/82	33
Virginia	48	7/82	382
Washington	49	5/82	134
West Virginia	50	8/82	80
Wisconsin	51	6/82	161
Wyoming	52	2/82	109
Puerto Rico	53	12/82	129
[Numbers reserved for outlying areas]	54-57	Not assigned	–
Abilene, TX	58	8/82	53
Akron, OH	59	9/82	132
Albany, GA	60	5/82	47
Albany-Schenectady-Troy, NY	61	11/82	161
Albuquerque, NM	62	7/82	94
Alexandria, LA	63	4/82	45
Allentown-Bethlehem-Easton, PA-NJ	64	9/82	133
Altoona, PA	65	9/82	51
Amarillo, TX	66	7/82	69
Anaheim-Santa Ana-Garden Grove, CA	67	7/82	199
Anchorage, AL	68	3/82	47
Anderson, IN	69	9/82	54
Anderson, SC	70	4/82	35
Ann Arbor, MI	71	6/82	54
Anniston, AL	72	6/82	48
Appleton-Oshkosh, WI	73	7/82	70
Arecibo, PR	74	12/82	58
Asheville, NC	75	9/82	50
Athens, GA	76	6/82	57
Atlanta, GA	77	7/82	309
Atlantic City, NJ	78	6/82	67
Augusta, GA-SC	79	6/82	80
Austin, TX	80	7/82	105
Bakersfield, CA	81	7/82	93
Baltimore, MD	82	7/82	286
Bangor, ME	83	3/82	35
Baton Rouge, LA	84	4/82	79
Battle Creek, MI	85	6/82	49
Bay City, MI	86	6/82	44
Beaumont-Port Arthur-Orange, TX	87	7/82	99
Bellingham, WA	88	4/82	42
Benton Harbor, MI	89	9/82	53
Billings, MT	90	3/82	44
Biloxi-Gulfport, MS	91	5/82	71
Binghamton, NY-PA	92	9/82	75

1980 Census of Population and Housing

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Area	Report number	Release date	Number of pages
Birmingham, AL	93	8/82	159
Bismarck, ND	94	3/82	41
Bloomington, IN	95	6/82	38
Bloomington-Normal, IL	96	7/82	42
Boise City, ID	97	2/82	58
Boston, MA	98	7/82	384
Bradenton, FL	99	7/82	60
Bremerton, WA	100	3/82	44
Bridgeton, CT	101	3/82	77
Bristol, CT	102	5/82	35
Brockton, MA	103	3/82	46
Brownsville-Harlingen-San Benito, TX	104	7/82	63
Bryan-College Station, TX	105	7/82	40
Buffalo, NY	106	7/82	172
Burlington, NC	107	6/82	45
Burlington, VT	108	2/82	37
Caguas, PR	109	12/82	61
Canton, OH	110	7/82	113
Casper, WY	111	3/82	40
Cedar Rapids, IA	112	4/82	52
Champaign-Urbana-Rantoul, IL	113	7/82	47
Charleston-N. Charleston, SC	114	4/82	72
Charleston, WV	115	7/82	60
Charlotte-Gastonia	116	6/82	110
Charlottesville, VA	117	6/82	43
Chattanooga, TN-GA	118	5/82	103
Chicago, IL	119	6/82	852
Chico, CA	120	7/82	35
Cincinnati, OH-KY-IN	121	9/82	159
Clarksville-Hopkinsville, TN-KY	122	7/82	45
Cleveland, OH	123	8/82	202
Colorado Springs, CO	124	3/82	64
Columbia, MO	125	7/82	35
Columbia, SC	126	7/82	83
Columbus, GA-AL	127	7/82	62
Columbus, OH	128	9/82	160
Corpus Christi, TX	129	7/82	67
Cumberland, MD-WV	130	8/82	44
Dallas-Ft. Worth, TX	131	7/82	481
Danbury, CT	132	5/82	44
Danville, VA	133	6/82	43
Davenport-Rock Island-Moline, IA-IL	134	7/82	85
Dayton, OH	135	8/82	141
Daytona Beach, FL	136	11/82	136
Decatur, IL	137	6/82	48

1980 Census of Population and Housing

Series PHC80-1, Block Statistics—Con.

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Area	Report number	Release date	Number of pages
Denver-Boulder, CO	138	3/82	266
Des Moines, IA	139	5/82	76
Detroit, MI	140	9/82	538
Dubuque, IA	141	4/82	39
Duluth-Superior, MN-WI	142	5/82	70
Eau Claire, WI	143	6/82	47
El Paso, TX	144	9/82	86
Elkhart, IN	145	6/82	49
Elmira, NY	146	8/82	46
Enid, OK	147	5/82	42
Erie, PA	148	8/82	58
Eugene-Springfield, OR	149	3/82	61
Evansville, IN-KY	150	7/82	69
Fall River, MA-RI	151	3/82	57
Fargo-Moorhead, ND-MN	152	3/82	46
Fayetteville, NC	153	6/82	54
Fayetteville-Springdale, AR	154	8/82	59
Fitchburg-Leominster, MA	155	5/82	38
Flint, MI	156	7/82	87
Florence, AL	157	6/82	51
Florence, SC	158	4/82	33
Ft. Collins, CO	159	3/82	43
Ft. Lauderdale-Hollywood, FL	160	9/82	159
Ft. Myers-Cape Coral, FL	161	8/82	73
Ft. Smith, AR-OK	162	5/82	57
Ft. Walton Beach, FL	163	9/82	40
Ft. Wayne, IN	164	5/82	71
Fresno, CA	165	8/82	85
Gadsden, AL	166	6/82	48
Gainesville, FL	167	9/82	46
Galveston-Texas City, TX	168	8/82	65
Gary-Hammond-East Chicago, IN	169	5/82	117
Glens Falls, NY	170	8/82	55
Grand Forks, ND-MN	171	3/82	37
Grand Rapids, MI	172	9/82	93
Great Falls, MT	173	2/82	44
Greeley, CO	174	3/82	39
Green Bay, WI	175	6/82	53
Greensboro–Winston-Salem–High Point, NC	176	9/82	149
Greenville-Spartanburg, SC	177	5/82	132
Hagerstown, MD	178	7/82	40
Hamilton-Middletown, OH	179	8/82	56
Harrisburg, PA	180	8/82	126
Hartford, CT	181	5/82	102
Hickory, NC	182	6/82	45

1980 Census of Population and Housing

Series PHC80-1, Block Statistics—Con.

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Area	Report number	Release date	Number of pages
Honolulu, HI	183	3/82	72
Houston, TX	184	8/82	370
Huntington-Ashland, WV-KY-OH	185	9/82	71
Huntsville, AL	186	6/82	62
Indianapolis, IN	187	7/82	178
Iowa City, IA	188	6/82	34
Jackson, MI	189	9/82	44
Jackson, MS	190	7/82	74
Jacksonville, FL	191	8/82	139
Jacksonville, NC	192	8/82	32
Janesville-Beloit, WI	193	6/82	50
Jersey City, NJ	194	6/82	63
Johnson City-Kingsport-Bristol, TN-VA	195	6/82	96
Johnstown, PA	196	8/82	54
Joplin, MO	197	8/82	60
Kalamazoo-Portage, MI	198	7/82	53
Kankakee, IL	199	7/82	39
Kansas City, MO-KS	200	7/82	242
Kenosha, WI	201	6/82	42
Killeen-Temple, TX	202	9/82	60
Knoxville, TN	203	6/82	99
Kokomo, IN	204	5/82	40
La Crosse, WI	205	6/82	40
Lafayette, LA	206	5/82	47
Lafayette-West Lafayette, IN	207	6/82	41
Lake Charles, LA	208	6/82	52
Lakeland-Winter Haven, FL	209	7/82	94
Lancaster, PA	210	8/82	93
Lansing-East Lansing, MI	211	7/82	71
Laredo, TX	212	7/82	51
Las Cruces, NM	213	5/82	40
Las Vegas, NV	214	3/82	87
Lawrence, KS	215	5/82	34
Lawrence-Haverhill, MA-NH	216	3/82	70
Lawton, OK	217	5/82	40
Lewiston-Auburn, ME	218	3/82	37
Lexington-Fayette, KY	219	6/82	50
Lima, OH	220	9/82	47
Lincoln, NE	221	4/82	63
Little Rock-North Little Rock, AR	222	5/82	93
Long Branch-Asbury Park, NJ	223	7/82	112
Longview-Marshall, TX	224	7/82	54
Lorain-Elyria, OH	225	9/82	57
Los Angeles-Long Beach, CA	226	8/82	738
Louisville, KY-IN	227	6/82	138

1980 Census of Population and Housing

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Area	Report number	Release date	Number of pages
Lowell, MA-NH	228	3/82	65
Lubbock, TX	229	7/82	62
Lynchburg, VA	230	6/82	50
Macon, GA	231	6/82	74
Madison, WI	232	6/82	66
Manchester, NH	233	3/82	52
Mansfield, OH	234	9/82	42
Mayaguez, PR	235	12/82	58
McAllen-Pharr-Edinburg, TX	236	9/82	68
Medford, OR	237	4/82	44
Melbourne-Titusville-Cocoa, FL	238	9/82	79
Memphis, TN-AR-MS	239	6/82	143
Meriden, CT	240	5/82	31
Miami, FL	241	9/82	255
Midland, TX	242	9/82	48
Milwaukee, WI	243	7/82	201
Minneapolis-St. Paul, MN-WI	244	7/82	343
Mobile, AL	245	6/82	81
Modesto, CA	246	9/82	73
Monroe, LA	247	4/82	50
Montgomery, AL	248	6/82	56
Muncie, IN	249	5/82	50
Muskegon-Norton Shores-Muskegon Heights, MI	250	9/82	52
Nashua, NH	251	3/82	42
Nashville-Davidson, TN	252	5/82	122
Nassau-Suffolk, NY	253	9/82	459
New Bedford, MA	254	3/82	57
New Britain, CT	255	5/82	40
New Brunswick-Perth Amboy-Sayreville, NJ	256	9/82	110
New Haven-West Haven, CT	257	6/82	77
New London-Norwich, CT-RI	258	3/82	62
New Orleans, LA	259	5/82	201
New York, NY-NJ	260	9/82	687
Newark, NJ	261	8/82	261
Newark, OH	262	9/82	39
Newburgh-Middletown, NY-NJ	263	8/82	71
Newport News, Hampton, VA	264	6/82	66
Norfolk-VA. Beach-Portsmouth, VA-NC	265	8/82	136
Northeast, PA	266	8/82	129
Norwalk, CT	267	5/82	41
Ocala, FL	268	9/82	43
Odessa, TX	269	9/82	53
Oklahoma City, OK	270	6/82	170
Olympia, WA	271	4/82	40
Omaha, NE-IA	272	5/82	126

1980 Census of Population and Housing

Series PHC80-1, Block Statistics—Con.

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Orlando, FL	273	8/82	136
Owensboro, KY	274	6/82	37
Oxnard-Simi Valley-Ventura, CA	275	9/82	79
Panama City, FL	276	8/82	53
Parkersburg-Marietta, WV-OH	277	7/82	50
Pascagoula-Moss Point, MS	278	6/82	48
Paterson-Clifton-Passaic, NJ	279	7/82	80
Pensacola, FL	280	9/82	81
Peoria, IL	281	8/82	77
Petersburg-Colonial Heights-Hopewell,VA	282	7/82	54
Philadelphia, PA-NJ	283	9/82	716
Phoenix, AR	284	7/82	219
Pine Bluff, AR	285	5/82	46
Pittsburg, PA	286	9/82	374
Pittsfield, MA	287	3/82	20
Ponce, PR	288	12/82	70
Portland, ME	289	5/82	50
Portland, OR-WA	290	3/82	241
Portsmouth-Dover-Rochester, NH-ME	291	5/82	45
Poughkeepsie, NY	292	9/82	61
Providence-Warwick-Pawtucket, RI-MA	293	3/82	196
Provo-Orem, UT	294	3/82	52
Pueblo, CO	295	3/82	56
Racine, WI	296	6/82	47
Raleigh-Durham, NC	297	6/82	94
Reading, PA	298	9/82	64
Redding, CA	299	9/82	38
Reno, NV	300	3/82	52
Richland-Kennewick-Pasco, WA	301	5/82	51
Richmond, VA	302	6/82	127
Riverside-San Bernardino-Ontario, CA	303	9/82	193
Roanoke, VA	304	6/82	65
Rochester, MN	305	4/82	36
Rochester, NY	306	9/82	165
Rockford, IL	307	7/82	78
Rock Hill, SC	308	4/82	39
Sacramento, CA	309	8/82	132
Saginaw, MI	310	7/82	56
St. Cloud, MN	311	5/82	41
St. Joseph, MO	312	8/82	47
St. Louis, MO-IL	313	11/82	327
Salem, OR	314	3/82	50
Salinas-Seaside-Monterey, CA	315	8/82	58
Salisbury-Concord, NC	316	7/82	56
Salt Lake City-Ogden, UT	317	5/82	133

1980 Census of Population and Housing

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San Angelo, TX	318	7/82	49
San Antonio, TX	319	9/82	83
San Diego, CA	320	9/82	194
San Francisco-Oakland, CA	321	9/82	369
San Jose, CA	322	9/82	156
San Juan, PR	323	12/82	160
Santa Barbara-Santa Maria-Lompoc, CA	324	9/82	58
Santa Cruz, CA	325	9/82	48
Santa Rosa, CA	326	9/82	53
Sarasota, FL	327	9/82	66
Savannah, GA	328	6/82	76
Seattle-Everett, WA	329	3/82	242
Sharon, PA	330	9/82	39
Sheboygan, WI	331	6/82	38
Sherman-Denison, TX	332	8/82	44
Shreveport, LA	333	5/82	77
Sioux City, IA-NE	334	3/82	52
Sioux Falls, SD	335	5/82	45
South Bend, IN	336	6/82	71
Spokane, WA	337	5/82	107
Springfield, IL	338	7/82	55
Springfield, MO	339	7/82	56
Springfield, OH	340	8/82	49
Springfield-Chicopee-Holyoke, MA-CT	341	4/82	99
Stamford, CT	342	5/82	47
State College, PA	343	8/82	29
Steubenville-Weirton, OH-WV	344	8/82	49
Stockton, CA	345	8/82	72
Syracuse, NY	346	9/82	131
Tacoma, WA	347	4/82	95
Tallahassee, FL	348	9/82	46
Tampa-St. Petersburg, FL	349	8/82	313
Terre Haute, IN	350	6/82	52
Texarkana, TX-AR	351	6/82	53
Toledo, OH-MI	352	9/82	121
Topeka, KS	353	7/82	54
Trenton, NJ	354	7/82	72
Tucson, AR	355	6/82	101
Tulsa, OK	356	6/82	127
Tuscaloosa, AL	357	7/82	44
Tyler, TX	358	9/82	50
Utica-Rome, NY	359	9/82	88
Vallejo-Fairfield-Napa, CA	360	9/82	63
Victoria, TX	361	7/82	39
Vineland-Millville-Bridgeton, NJ	362	6/82	44

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Area	Report number	Release date	Number of pages
Visalia-Tulare-Porterville, CA	363	8/82	50
Waco, TX	364	9/82	62
Washington, DC-MD-VA	365	9/82	323
Waterbury, CT	366	6/82	50
Waterloo-Cedar Falls, IA	367	5/82	55
Wausau, WI	368	7/82	45
West Palm Beach-Boca Raton, FL	369	8/82	111
Wheeling, WV-OH	370	5/82	56
Wichita, KS	371	6/82	97
Wichita Falls, TX	372	7/82	53
Williamsport, PA	373	8/82	42
Wilmington, DE-NJ-MD	374	7/82	100
Wilmington, NC	375	6/82	47
Worcester, MA	376	4/82	80
Yakima, WA	377	4/82	51
York, PA	378	8/82	64
Youngstown-Warren, OH	379	9/82	97
Yuba City, CA	380	9/82	37

– Means not applicable. * Printed report only, $12.

1980 Census of Population and Housing
Series PHC80-2, Census Tracts

Area	Report number	Release date	Number of pages	Price (dollars)
U.S. Summary	1	3/84	80	3.00
Alabama	2	8/83	402	8.50
Alaska	3	1/84	111	4.75
Arizona	4	8/83	172	5.50
Arkansas	5	8/83	80	4.50
California	6	8/83	443	10.00
Colorado	7	8/83	117	5.00
Connecticut	8	8/83	193	6.00
Delaware	9	9/83	166	4.25
District of Columbia	10	(see 365)	–	–
Florida	11	8/83	270	7.00
Georgia	12	8/83	132	5.50
Hawaii	13	7/83	191	6.00
Idaho	14	7/83	155	5.50
Illinois	15	9/83	180	6.00
Indiana	16	9/83	200	6.00
Iowa	17	9/83	211	6.00
Kansas	18	8/83	140	5.50
Kentucky	19	9/83	96	4.50
Louisiana	20	7/83	215	6.00
Maine	21	8/83	193	6.00
Maryland	22	8/83	162	5.50
Massachusetts	23	8/83	255	6.50
Michigan	24	9/83	148	5.50
Minnesota	25	9/83	92	4.50
Mississippi	26	8/83	305	7.50
Missouri	27	8/83	79	4.50
Montana	28	7/83	124	5.00
Nebraska	29	8/83	69	4.50
Nevada	30	8/83	192	4.50
New Hampshire	31	8/83	125	5.00
New Jersey	32	9/83	218	6.00
New Mexico	33	8/83	362	8.00
New York	34	9/83	112	4.75
North Carolina	35	8/83	466	9.00
North Dakota	36	Not assigned	–	–
Ohio	37	9/83	237	6.50
Oklahoma	38	8/83	303	7.50
Oregon	39	9/83	172	5.50
Pennsylvania	40	9/83	160	5.50
Rhode Island	41	8/83	111	4.75
South Carolina	42	8/83	203	6.00
South Dakota	43	8/83	139	5.50
Tennessee	44	9/83	200	6.00
Texas	45	9/83	288	7.00
Utah	46	Not assigned	–	–

1980 Census of Population and Housing
Series PHC80-2, Census Tracts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Vermont	47	7/83	69	4.50
Virginia	48	8/83	258	6.50
Washington	49	9/83	120	5.00
West Virginia	50	9/83	232	6.50
Wisconsin	51	9/83	164	5.50
Wyoming	52	8/83	122	5.00
Puerto Rico	53	4/84	129	4.75
	54-57	Not assigned	–	–
Abilene, TX	58	8/83	132	5.50
Akron, OH	59	9/83	263	6.50
Albany, GA	60	8/83	149	5.50
Albany-Schenectady-Troy, NY	61	9/83	289	7.00
Albuquerque, NM	62	8/83	268	6.50
Alexandria, LA	63	8/83	138	5.50
Allentown-Bethlehem-Easton, PA-NJ	64	9/83	220	6.00
Altoona, PA	65	9/83	116	4.75
Amarillo, TX	66	8/83	157	5.50
Anaheim-Santa Ana-Garden Grove, CA				
Section 1 of 2	67	10/83	464	11.00 per set
Section 2 of 2			640	
Anchorage, AK	68	8/83	113	4.75
Anderson, IN	69	9/83	132	5.00
Anderson, SC	70	8/83	134	5.00
Ann Arbor, MI	71	9/83	216	6.00
Anniston, AL	72	8/83	134	5.00
Appleton-Oshkosh, WI	73	9/83	220	6.00
Arecibo, PR	74	4/84	142	5.00
Asheville, NC	75	8/83	137	5.50
Athens, GA	76	8/83	139	5.50
Atlanta, GA	77	8/83	703	8.50
Atlantic City, NJ	78	9/83	154	5.50
Augusta, GA-SC	79	8/83	268	6.50
Austin, TX	80	8/83	325	7.50
Bakersfield, CA	81	8/83	259	6.50
Baltimore, MD	82	9/83	872	9.00
Bangor, ME	83	8/83	100	4.75
Baton Rouge, LA	84	7/83	238	6.50
Battle Creek, MI	85	10/83	171	5.50
Bay City, MI	86	9/83	112	4.75
Beaumont-Port Arthur-Orange, TX	87	8/83	279	7.00
Bellingham, WA	88	9/83	120	5.00
Benton Harbor, MI	89	9/83	148	5.50
Billings, MT	90	8/83	102	4.75
Biloxi-Gulfport, MS	91	9/83	175	6.00
Binghamton, NY-PA	92	9/83	144	5.50

1980 Census of Population and Housing
Series PHC80-2, Census Tracts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Birmingham, AL	93	8/83	496	11.00
Bismarck, ND	94	9/83	106	4.75
Bloomington, IN	95	9/83	117	5.00
Bloomington-Normal, IL	96	9/83	136	5.00
Boise City, ID	97	7/83	136	5.00
Boston, MA	98	8/83	604	6.50
Bradenton, FL	99	8/83	131	5.50
Bremerton, WA	100	9/83	140	$5.50
Bridgeport, CT	101	9/83	199	6.00
Bristol, CT	102	8/83	95	4.50
Brockton, MA	103	8/83	120	5.00
Brownsville-Harlingen-San Benito, TX	104	9/83	185	6.00
Bryan-College Station, TX	105	8/83	110	5.00
Buffalo, NY	106	9/83	352	8.00
Burlington, NC	107	8/83	121	5.00
Burlington, VT	108	8/83	108	4.75
Caguas, PR	109	4/84	176	5.50
Canton, OH	110	9/83	234	6.50
Casper, WY	111	8/83	120	5.00
Cedar Rapids, IA	112	9/83	142	5.50
Champaign-Urbana-Rantou, IL	113	9/83	168	5.50
Charleston-N. Charleston, SC	114	8/83	325	7.50
Charleston, WV	115	9/83	156	5.50
Charlotte-Gastonia, NC	116	8/83	331	7.50
Charlottesville, VA	117	8/83	120	5.00
Chattanooga, TN-GA	118	9/83	236	6.50
Chicago, IL				
Section 1 of 4	119	10/83	608	20.00 per set
Section 2 of 4			660	
Section 3 of 4			664	
Section 4 of 4			840	
Chico, CA	120	8/83	143	5.50
Cincinnati, OH-KY-IN	121	9/83	612	8.00
Clarksville-Hopkinsville, TN-KY	122	9/83	188	6.00
Cleveland, OH	123	9/83	656	7.50
Colorado Springs, CO	124	7/83	225	6.50
Columbus, MO	125	8/83	117	5.00
Columbus, SC	126	8/83	313	7.50
Columbus, GA-AL	127	8/83	195	6.00
Columbus, OH	128	9/83	611	7.50
Corpus Christi, TX	129	8/83	189	5.50
Cumberland, MD-WV	130	9/83	116	4.75
Dallas-Fort Worth, TX				
Section 1 of 2	131	9/83	686	13.00 per set
Section 2 of 2			608	
Danbury, CT	132	8/83	115	5.00

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Area	Report number	Release date	Number of pages	Price (dollars)
Danville, VA	133	8/83	124	5.00
Davenport-Rock Island, IA-IL	134	9/83	260	6.50
Dayton, OH	135	9/83	456	6.50
Daytona Beach, FL	136	8/83	195	6.00
Decatur, IL	137	9/83	152	5.50
Denver-Boulder, CO	138	9/83	757	8.00
Des Moines, IA	139	9/83	194	6.00
Detroit, MI				
Section 1 of 2	140	10/83	668	12.00 per set
Section 2 of 2			640	
Dubuque, IA	141	9/83	104	4.75
Duluth-Superior, MN-WI	142	9/83	164	5.50
Eau Claire, WI	143	9/83	116	4.75
El Paso, TX	144	8/83	194	6.00
Elkhart, IN	145	9/83	124	5.00
Elmira, NY	146	9/83	102	4.75
Enid, OK	147	8/83	96	4.75
Erie, PA	148	9/83	128	5.00
Eugene-Springfield, OR	149	9/83	180	6.00
Evansville, IN-KY	150	9/83	175	6.00
Fall River, MA-RI	151	7/83	115	5.00
Fargo-Moorhead, ND-MN	152	9/83	133	5.00
Fayetteville, NC	153	8/83	196	6.00
Fayetteville-Springdale, AR	154	8/83	136	5.50
Fitchburg-Leominster, MA	155	7/83	110	4.75
Flint, MI	156	9/83	216	6.00
Florence, AL	157	8/83	128	5.00
Florence, SC	158	8/83	125	5.00
Ft. Collins, CO	159	7/83	141	5.50
Ft. Lauderdale-Hollywood, FL	160	8/83	433	8.50
Ft. Myers-Cape Coral, FL	161	8/83	147	5.50
Ft. Smith, AR-OK	162	8/83	151	5.50
Ft. Walton Beach, FL	163	8/83	137	5.50
Ft. Wayne, IN	164	9/83	194	6.00
Fresno, CA	165	8/83	312	7.50
Gadsden, AL	166	8/83	137	5.50
Gainesville, FL	167	8/83	139	5.50
Galveston-Texas City, TX	168	8/83	194	6.00
Gary-Hammond-East Chicago, IN	169	9/83	275	7.00
Glens Fall, NY	170	9/83	107	4.75
Grand Forks, ND-MN	171	9/83	118	5.00
Grand Rapids, MI	172	9/83	240	6.50
Great Falls, MT	173	8/83	129	5.00
Greeley, CO	174	7/83	140	5.50
Green Bay, WI	175	10/83	156	5.50
Greensboro–Winston-Salem–High Point, NC	176	7/83	428	8.50
Greenville-Spartansburg, SC	177	8/83	369	8.00

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Area	Report number	Release date	Number of pages	Price (dollars)
Hagerstown, MD	178	8/83	115	5.00
Hamilton-Middletown, OH	179	9/83	164	5.50
Harrisburg, PA	180	9/83	184	6.00
Hartford, CT	181	9/83	235	6.50
Hickory, NC	182	8/83	121	5.00
Honolulu, HI	183	8/83	476	9.50
Houston, TX				
Section 1 of 2	184	9/83	616	12.00 per set
Section 2 of 2			607	
Huntington-Ashland, WV-KY-OH	185	9/83	200	6.00
Huntsville, AL	186	8/83	235	6.50
Indianapolis, IN	187	9/83	488	7.00
Iowa City, IA	188	9/83	120	5.00
Jackson, MI	189	11/83	113	4.75
Jackson, MS	190	8/83	206	6.00
Jacksonville, FL	191	8/83	303	7.50
Jacksonville, NC	192	8/83	128	5.00
Janesville-Beloit, WI	193	9/83	121	5.00
Jersey City, NJ	194	9/83	280	6.00
Johnson City-Kingsport-Bristol, TN-VA	195	9/83	268	6.50
Johnstown, PA	196	9/83	136	5.00
Joplin, MO	197	9/83	140	5.50
Kalamazoo-Portage, MI	198	9/83	160	5.50
Kankakee, IL	199	9/83	118	5.00
Kansas City, MO-KS	200	8/83	638	8.00
Kenosha, WI	201	9/83	128	5.00
Killeen-Temple, TX	202	9/83	203	6.00
Knoxville, TN	203	9/83	244	6.50
Kokomo, IN	204	9/83	124	5.00
La Crosse, WI	205	9/83	96	4.50
Lafayette, LA	206	8/83	136	5.00
Lafayette-West Lafayette, IN	207	9/83	142	5.50
Lake Charles, LA	208	8/83	155	5.50
Lakeland-Winter Haven, FL	209	8/83	227	6.50
Lancaster, PA	210	10/83	168	5.50
Lansing-East Lansing, MI	211	9/83	256	6.50
Laredo, TX	212	9/83	104	4.75
Las Cruces, NM	213	8/83	131	5.00
Las Vegas, NV	214	8/83	242	6.50
Lawrence, KS	215	8/83	111	4.75
Lawrence-Haverhill, MA-NH	216	8/83	138	5.50
Lawton, OK	217	8/83	130	5.00
Lewiston-Auburn, ME	218	8/83	76	4.50
Lexington-Fayette, KY	219	9/83	201	6.00
Lima, OH	220	9/83	159	5.50
Lincoln, NE	221	8/83	142	5.50
Little Rock-North Little Rock, AR	222	8/83	269	6.50

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Series PHC80-2, Census Tracts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Long Beach-Asbury Park, NJ	223	9/83	204	6.00
Longview-Marshall, TX	224	8/83	156	5.50
Lorain-Elyria, OH	225	9/83	195	6.00
Los Angeles-Long Beach, CA				
Section 1 of 4	226	10/83	796	22.00 per set
Section 2 of 4			560	
Section 3 of 4			780	
Section 4 of 4			736	
Louisville, KY-IN	227	10/83	448	7.00
Lowell, MA-NH	228	8/83	126	5.00
Lubbock, TX	229	8/83	130	5.50
Lynchburg, VA	230	9/83	148	5.50
Macon, GA	231	8/83	223	6.50
Madison, WI	232	7/83	196	6.00
Manchester, NH	233	8/83	128	5.00
Mansfield, OH	234	9/83	120	5.00
Mayaguez, PR	235	4/84	180	5.50
McAllen-Pharr-Edinburg, TX	236	9/83	196	6.00
Medford, OR	237	9/83	136	5.00
Melbourne-Titusville-Cocoa, FL	238	8/83	225	6.00
Memphis, TN-AR-MS	239	9/83	408	8.50
Meriden, CT	240	8/83	95	4.50
Miami, FL	241	8/83	761	8.50
Midland, TX	242	8/83	116	5.00
Milwaukee, WI	243	10/83	504	7.00
Minneaplis-St. Paul, Mn-WI	244	9/83	724	8.50
Mobil, AL	245	8/83	255	6.50
Modesto, CA	246	8/83	204	6.00
Monroe, LA	247	7/83	157	5.50
Montgomery, AL	248	8/83	214	6.00
Muncie, IN	249	9/83	124	5.00
Muskegon-Norton Shores-Muskegon Heights, MI	250	9/83	140	5.50
Nashua, NH	251	7/83	108	4.75
Nashville-Davidson, TN	252	9/83	376	8.00
Nassau-Suffolk, NY	253	9/83	896	9.00
New Bedford, MA	254	7/83	117	5.00
New Britain, CT	255	8/83	98	4.75
New Brunswick-Perth Amboy-Sayreville, NJ	256	9/83	241	6.50
New Haven-West Haven, CT	257	9/83	188	6.00
New London-Norwich, CT-RI	258	8/83	160	5.50
New Orleans, LA	259	8/83	530	6.50
New York, NY-NJ				
Section 1 of 4	260	10/83	884	23.00 per set
Section 2 of 4			817	
Section 3 of 4			799	
Section 4 of 4			495	
Newark, NJ	261	9/83	672	12.00
Newark, OH	262	9/83	124	5.00

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Series PHC80-2, Census Tracts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Newburgh-Middletown, NY	263	8/83	153	5.50
Newport News-Hampton, VA	264	8/83	183	6.00
Norfolk-Virginia Beach-Portsmouth, VA-NC	265	9/83	320	7.50
Northeast, PA	266	9/83	220	6.00
Norwalk, CT	267	9/83	108	4.75
Ocala, FL	268	8/83	119	5.00
Odessa, TX	269	9/83	123	5.00
Oklahoma City, OK	270	8/83	497	11.00
Olympia, WA	271	10/83	134	5.50
Omaha, NE-IA	272	9/83	281	7.00
Orlando, FL	273	8/83	477	11.00
Owensboro, KY	274	9/83	109	4.75
Oxnard-Simi Valley-Ventura, CA	275	8/83	317	7.50
Panama City, FL	276	8/83	118	5.00
Parkersburg-Marietta, WV-OH	277	9/83	148	5.50
Pascagoula-Moss Point, MS	278	8/83	140	5.50
Paterson-Clifton-Passaic, NJ	279	9/83	198	6.00
Pensacola, FL	280	8/83	224	6.50
Peoria, IL	281	10/83	228	6.50
Petersburg-Colonial Hts.-Hopewell, VA	282	9/83	131	5.00
Philadelphia, PA-NJ				
Section 1 of 2	283	10/83	622	12.00 per set
Section 2 of 2			609	
Phoenix, AZ	284	8/83	551	7.00
Pine Bluff, AR	285	8/83	136	5.50
Pittsburgh, PA	286	9/83	732	8.50
Pittsfield, MA	287	7/83	95	4.50
Ponce, PR	288	4/84	199	7.00
Portland, ME	289	8/83	131	5.00
Portland, OR-WA	290	10/83	565	7.50
Portsmouth-Dover-Rochester, NH-ME	291	8/83	135	5.50
Poughkeepsie, NY	292	9/83	143	5.50
Providence-Warwick-Pawtucket, RI-MA	293	8/83	283	7.00
Provo-Orem, UT	294	8/83	158	5.50
Pueblo, CO	295	8/83	161	5.50
Racine, WI	296	9/83	132	5.00
Raleigh-Durham, NC	297	8/83	378	8.00
Reading, PA	298	9/83	144	5.50
Redding, CA	299	8/83	127	5.00
Reno, NV	300	8/83	157	5.50
Richland-Kennewick-Pasco, WA	301	9/83	152	5.50
Richmond, VA	302	8/83	344	8.00
Riverside-San Bernardino-Ontario, CA	303	8/83	715	8.50
Roanoke, VA	304	9/83	148	5.50
Rochester, MN	305	9/83	115	5.00
Rochester, NY	306	9/83	336	7.50
Rockford, IL	307	9/83	206	6.00

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Area	Report number	Release date	Number of pages	Price (dollars)
Rock Hill, SC	308	8/83	142	5.50
Sacramento, CA	309	8/83	489	11.00
Saginaw, MI	310	9/83	136	5.00
St. Cloud, MN	311	9/83	125	5.00
St. Joseph, MO	312	9/83	109	4.75
St. Louis, MO-IL				
Section 1 of 2	313	9/83	460	10.00 per set
Section 2 of 2			376	
Salem, OR	314	9/83	160	5.50
Salinas-Seaside-Monterey, CA	315	8/83	217	6.00
Salisbury-Concord, NC	316	8/83	156	5.50
Salt Lake City-Ogden, UT	317	8/83	437	10.00
San Angelo, TX	318	9/83	122	5.00
San Antonio, TX	319	8/83	424	7.00
San Diego, CA	320	10/83	184	9.00
San Francisco-Oakland, CA				
Section 1 of 2	321	9/83	676	14.00 per set
Section 2 of 2			856	
San Jose, CA	322	8/83	790	9.00
San Juan, PR	323	4/84	508	16.00
Santa Barbara-Santa Maria-Lompoc, CA	324	8/83	208	6.00
Santa Cruz, CA	325	8/83	161	5.50
Santa Rosa, CA	326	8/83	182	6.00
Sarasota, FL	327	8/83	138	5.50
Savannah, GA	328	8/83	201	6.00
Seattle-Everett, WA	329	10/83	676	8.50
Sharon, PA	330	10/83	100	4.50
Sheboygan, WI	331	10/83	100	4.50
Sherman-Denison, TX	332	8/83	124	5.00
Shreveport, LA	333	8/83	253	6.50
Sioux City, IA-NE	334	9/83	117	5.00
Sioux Falls, SD	335	8/83	114	5.00
South Bend, IN	336	9/83	184	6.00
Spokane, WA	337	9/83	180	6.00
Springfield, IL	338	9/83	152	5.50
Springfield, MO	339	8/83	145	5.50
Springfield, OH	340	9/83	152	5.50
Springfield-Chicopee-Holyoke, MA-CT	341	8/83	211	6.00
Stamford, CT	342	8/83	126	5.00
State College, PA	343	9/83	112	4.75
Steubenville-Weirton, OH-WV	344	9/83	136	5.00
Stockton, CA	345	8/83	286	7.00
Syracuse, NY	346	9/83	263	6.50
Tacoma, WA	347	9/83	216	6.00
Tallahassee, FL	348	8/83	148	5.50
Tampa-St. Petersburg, FL	349	8/83	632	8.00
Terre Haute, IN	350	9/83	128	5.00
Texarkana, TX-Texarkana, AR	351	8/83	147	5.50
Toledo, OH-MI	352	9/83	344	8.00

1980 Census of Population and Housing

Series PHC80-2, Census Tracts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Topeka, KS	353	8/83	155	5.50
Trenton, NJ	354	9/83	169	5.50
Tucson, AZ	355	8/83	236	6.50
Tulsa, OK	356	8/83	350	8.00
Tuscaloosa, AL	357	8/83	153	5.50
Tyler, TX	358	8/83	127	5.00
Utica-Rome, NY	359	9/83	166	5.50
Vallejo-Fairfield-Napa, CA	360	8/83	288	7.00
Victoria, TX	361	8/83	107	4.75
Vineland-Millville-Bridgeton, NJ	362	8/83	123	5.00
Visalia-Tulare-Porterville, CA	363	8/83	174	6.00
Waco, TX	364	8/83	157	5.50
Washington, DC-MD-VA				
Section 1 of 2	365	9/83	748	13.00 per set
Section 2 of 2			753	
Waterbury, CT	366	9/83	136	5.50
Waterloo-Cedar Falls, IA	367	9/83	128	5.00
Wausau, WI	368	9/83	108	4.75
West Palm Beach-Boca Raton, FL	369	8/83	329	7.50
Wheeling, WV-OH	370	9/83	144	5.50
Wichita, KS	371	8/83	203	6.00
Williamsport, PA	373	9/83	108	4.75
Wilmington, DE-NJ-MD	374	8/83	281	7.00
Wilmington, NC	375	8/83	130	5.00
Worcester, MA	376	7/83	152	5.50
Yakima, WA	377	9/83	136	5.00
York, PA	378	9/83	152	5.50
Youngstown-Warren, OH	379	9/83	279	7.00
Yuba City, CA	380	8/83	128	5.00

– Means not applicable.

1980 Census of Population and Housing

Series PHC80-3, Summary Characteristics for Governmental Units and Standard Metropolitan Statistical Areas

Area	Report number	Release date	Number of pages	Price (dollars)
U.S. Summary	1	No report in series	–	–
Alabama	2	11/82	77	5.00
Alaska	3	11/82	54	4.75
Arizona	4	11/82	49	5.00
Arkansas	5	11/82	77	5.50
California	6	11/82	78	5.00
Colorado	7	11/82	63	5.00
Connecticut	8	12/82	55	4.75
Delaware	9	12/82	43	4.75
District of Columbia	10	11/82	41	4.50
Florida	11	11/82	73	5.00
Georgia	12	11/82	91	5.00
Hawaii	13	12/82	40	4.50
Idaho	14	11/82	55	4.75
Illinois	15	12/82	246	7.50
Indiana	16	12/82	176	6.50
Iowa	17	11/82	115	5.50
Kansas	18	12/82	197	7.00
Kentucky	19	12/82	78	5.00
Louisiana	20	11/82	67	5.00
Maine	21	11/82	79	5.00
Maryland	22	11/82	47	4.75
Massachusetts	23	11/82	67	5.00
Michigan	24	11/82	179	6.50
Minnesota	25	12/82	239	7.50
Mississippi	26	11/82	67	5.00
Missouri	27	11/82	135	6.00
Montana	28	10/82	52	4.75
Nebraska	29	11/82	125	6.00
Nevada	30	11/82	68	4.75
New Hampshire	31	11/82	60	4.75
New Jersey	32	11/82	85	5.00
New Mexico	33	11/82	49	4.75
New York	34	11/82	161	6.50
North Carolina	35	11/82	92	5.00
North Dakota	36	11/82	169	6.50
Ohio	37	12/82	215	7.00
Oklahoma	38	11/82	87	5.50
Oregon	39	11/82	61	4.75
Pennsylvania	40	12/82	233	7.50
Rhode Island	41	1/83	43	4.75
South Carolina	42	11/82	61	4.75
South Dakota	43	11/82	143	6.00
Tennessee	44	11/82	73	5.00
Texas	45	11/82	139	6.00
Utah	46	11/82	59	4.75

1980 Census of Population and Housing

Series PHC80-3, Summary Characteristics for Governmental Units and Standard Metropolitan Statistical Areas—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Vermont	47	12/82	65	5.00
Virginia	48	11/82	67	5.00
Washington	49	12/82	61	4.75
West Virginia	50	11/82	62	4.75
Wisconsin	51	11/82	171	6.50
Wyoming	52	1/83	38	4.75
Puerto Rico	53	6/83	72	4.50

– Means not applicable.

1980 Census of Population and Housing
Series PHC80-4, Congressional Districts of the 98th Congress

Area	Report number	Release date	Number of pages	Price (dollars)
Alabama	2	3/83	63	4.75
Alaska	3	3/83	57	4.75
Arizona	4	4/83	67	5.00
Arkansas	5	3/83	59	4.75
California	6	4/83	157	6.50
Colorado	7	4/83	60	5.00
Connecticut	8	3/83	62	4.75
Delaware	9	3/83	57	4.75
Dist. of Columbia	10	4/83	57	4.75
Florida	11	4/83	93	5.50
Georgia	12	4/83	66	5.00
Hawaii	13	4/83	57	4.75
Idaho	14	4/83	58	4.75
Illinois	15	4/83	107	5.50
Indiana	16	4/83	69	5.00
Iowa	17	3/83	60	4.75
Kansas	18	4/83	60	4.75
Kentucky	19	3/83	63	4.75
Louisiana	20	4/83	68	5.00
Maine	21	3/83	57	4.75
Maryland	22	4/83	68	5.00
Massachusetts	23	4/83	75	5.00
Michigan	24	4/83	81	5.50
Minnesota	25	4/83	68	5.00
Mississippi	26	4/83	60	4.75
Missouri	27	4/83	68	5.00
Montana	28	3/83	58	4.75
Nebraska	29	3/83	59	4.75
Nevada	30	4/83	59	4.75
New Hampshire	31	5/83	57	4.75
New Jersey	32	5/83	79	5.00
New Mexico	33	5/83	57	4.75
New York	34	5/83	120	5.50
North Carolina	35	4/83	72	5.00
North Dakota	36	3/83	57	4.75
Ohio	37	4/83	88	5.50
Oklahoma	38	4/83	69	5.00
Oregon	39	4/83	68	5.00
Pennsylvania	40	5/83	99	5.50
Rhode Island	41	4/83	58	4.75
South Carolina	42	5/83	61	4.75
South Dakota	43	4/83	57	4.75
Tennessee	44	4/83	63	4.75
Texas	45	4/83	107	5.50
Utah	46	5/83	59	4.75
Vermont	47	3/83	57	4.75
Virginia	48	4/83	69	5.00
Washington	49	4/83	68	5.00
West Virginia	50	3/83	59	4.75
Wisconsin	51	4/83	70	5.00
Wyoming	52	4/83	57	4.75

1980 Census of Population and Housing
Series PHC80-4, Congressional Districts of the 99th Congress

Title	Report number	Release date	Number of pages	Price (dollars)
California	6	3/85	164	5.50
Hawaii	13	1/85	60	2.25
Louisiana	20	2/85	72	3.00
Maine	21	7/84	58	2.25
Mississippi	26	2/85	68	2.75
Montana	28	5/84	57	2.50
New Jersey	32	11/84	84	3.00
New York	34	10/84	128	4.75
Texas	45	8/84	108	4.50
Washington	49	9/84	72	3.00

1980 Census of Population and Housing
Series PHC80-4, Congressional Districts of the 100th Congress

Title	Report number	Release date	Number of pages	Price (dollars)
Ohio	37	5/86	96	4.50

1980 Census of Population and Housing
PHC80-E Series

Title	Release date	Number of pages	Price (dollars)
E1. The Coverage of Housing in the 1980 Census	8/85	68	2.50
E2. Content Reinterview Study: Accuracy of Data for Selected Population and Housing Characteristics as Measured by Reinterview	10/86	148	7.00
E3. Programs to Improve Coverage in the 1980 Census	3/87	84	4.00
E4. Coverage of Population in the 1980 Census	2/88	123	6.00

1980 Census of Population and Housing
PHC80-P, Preliminary Population and Housing Unit Counts

Area	Report number	Release date	Number of pages	Price (dollars)
United States	1	3/81	2	.35
Alabama	2	2/81	12	.45
Alaska	3	2/81	6	.35
Arizona	4	2/81	4	.35
Arkansas	5	2/81	18	.70
California	6	2/81	12	.60
Colorado	7	1/81	8	.45
Connecticut	8	2/81	6	.45
Delaware	9	12/80	3	.35
District of Columbia	10	12/80	2	.35
Florida	11	2/81	12	.60
Georgia	12	2/81	15	.60
Hawaii	13	1/81	3	.35
Idaho	14	12/80	6	.35
Illinois	15	2/81	31	.90
Indiana	16	2/81	20	.70
Iowa	17	2/81	26	.85
Kansas	18	2/81	19	.85
Kentucky	19	2/81	12	.60
Louisiana	20	2/81	11	.45
Maine	21	12/80	8	.45
Maryland	22	1/80	6	.45
Massachusetts	23	12/80	8	.45
Michigan	24	2/81	20	.70
Minnesota	25	2/81	24	1.00
Mississippi	26	2/81	11	.45
Missouri	27	2/81	24	.70
Montana	28	1/81	7	.35
Nebraska	29	2/81	16	.70
Nevada	30	12/80	3	.35
New Hampshire	31	12/80	4	.35
New Jersey	32	2/81	8	.60
New Mexico	33	1/81	6	.35
New York	34	2/81	20	.70
North Carolina	35	2/81	16	.70
North Dakota	36	12/80	15	.45
Ohio	37	2/81	24	.85
Oklahoma	38	2/81	24	.45
Oregon	39	2/81	8	.45
Pennsylvania	40	2/81	24	1.00
Rhode Island	41	12/80	4	.35
South Carolina	42	2/81	8	.45
South Dakota	43	12/80	14	.70
Tennessee	44	2/81	12	.45
Texas	45	2/81	27	.85
Utah	46	1/81	7	.35

1980 Census of Population and Housing

PHC80-P, Preliminary Population and Housing Unit Counts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Vermont	47	11/80	4	.35
Virginia	48	2/81	10	.45
Washington	49	2/81	9	.45
West Virginia	50	12/80	8	.45
Wisconsin	51	2/81	20	.85
Wyoming	52	11/80	8	.35
Puerto Rico	53	3/81	11	.45
Guam	54	6/81	2	.35
Virgin Islands of the U.S.	55	6/81	2	.35
American Samoa	56	6/81	3	.35

1980 Census of Population and Housing
PHC80-V, Final Population and Housing Unit Counts

Area	Report number	Release date	Number of pages	Price (dollars)
United States	1	4/81	10	1.00
Alabama	2	4/81	20	.45
Alaska	3	4/81	9	.35
Arizona	4	3/81	8	.35
Arkansas	5	4/81	32	.70
California	6	4/81	20	.60
Colorado	7	4/81	15	.45
Connecticut	8	3/81	8	.45
Delaware	9	3/81	6	.35
District of Columbia	10	3/81	4	.35
Florida	11	4/81	19	.60
Georgia	12	4/81	28	.60
Hawaii	13	4/81	13	.35
Idaho	14	3/81	12	.35
Illinois	15	4/81	60	.90
Indiana	16	4/81	32	.70
Iowa	17	3/81	48	.85
Kansas	18	4/81	36	.85
Kentucky	19	4/81	21	.60
Louisiana	20	4/81	19	.45
Maine	21	3/81	11	.45
Maryland	22	3/81	12	.45
Massachusetts	23	3/81	10	.45
Michigan	24	4/81	32	.70
Minnesota	25	4/81	46	1.00
Mississippi	26	4/81	20	.45
Missouri	27	4/81	44	.70
Montana	28	3/81	11	.35
Nebraska	29	4/81	32	.70
Nevada	30	3/81	7	.35
New Hampshire	31	3/81	8	.35
New Jersey	32	3/81	15	.60
New Mexico	33	4/81	10	.35
New York	34	4/81	30	.70
North Carolina	35	4/81	30	.70
North Dakota	36	3/81	30	.45
Ohio	37	4/81	44	.85
Oklahoma	38	4/81	23	.45
Oregon	39	4/81	13	.45
Pennsylvania	40	4/81	46	1.00
Rhode Island	41	3/81	6	.35
South Carolina	42	4/81	16	.45
South Dakota	43	3/81	24	.70
Tennessee	44	4/81	20	.45
Texas	45	4/81	48	.85
Utah	46	3/81	11	.35

1980 Census of Population and Housing

PHC80-V. Final Population and Housing Unit Counts—Con.

Area	Report number	Release date	Number of pages	Price (dollars)
Vermont	47	3/81	8	.35
Virginia	48	3/81	17	.45
Washington	49	3/81	14	.45
West Virginia	50	3/81	16	.45
Wisconsin	51	4/81	34	.85
Wyoming	52	4/81	7	.35
Puerto Rico	53	3/82	11	.45
Guam	54	10/82	4	.35
Virgin Islands of the U.S.	55	10/82	4	.35
American Samoa	56	11/82	5	.35

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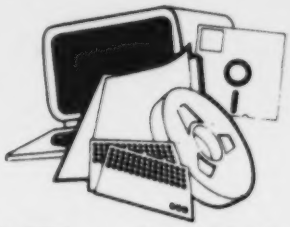

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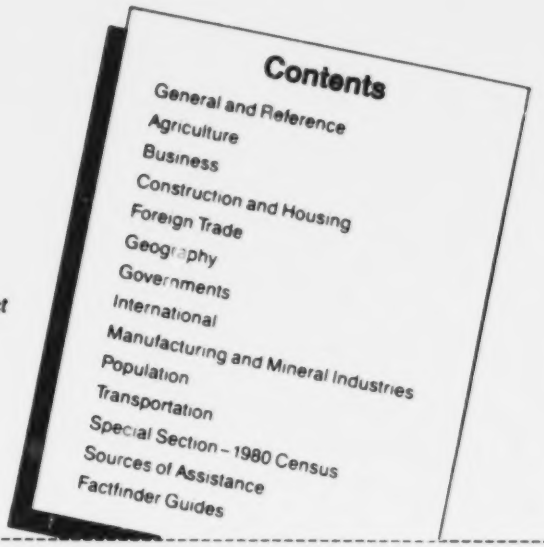

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